

SHARP® SERVICE MANUAL

SY210R4G54EHW

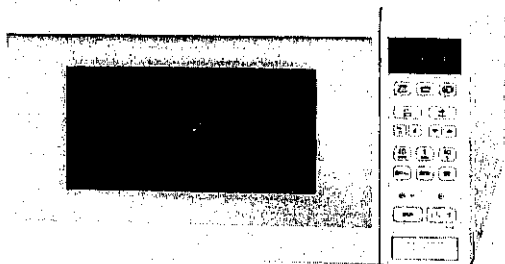


Photo R-4G54(W)

GRILL AND MICROWAVE OVEN

MODELS **R-4G54(W)**
R-4G54(B)

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

TABLE OF CONTENTS

	Page
GENERAL IMPORTANT INFORMATION	1
CAUTION, MICROWAVE RADIATION, WARNING	1
PRODUCT SPECIFICATIONS	2
APPEARANCE VIEW	3
OPERATION SEQUENCE	4
FUNCTION OF IMPORTANT COMPONENTS	5
SERVICING	7
TEST PROCEDURE	9
TOUCH CONTROL ASSEMBLY	16
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE	21
MICROWAVE MEASUREMENT	26
TEST DATA AT A GLANCE	27
WIRING DIAGRAM	28
PICTORIAL DIAGRAM	30
CONTROL PANEL CIRCUIT	31
PRINTED WIRING DIAGRAM	32
PARTS LIST	33
PACKING AND ACCESSORIES	38

SHARP CORPORATION

SERVICE MANUAL

SHARP

GRILL AND MICROWAVE OVEN

R-4G54(W)/ R-4G54(B)

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

CAUTION MICROWAVE RADIATION

Service engineers should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

WARNING

Never operate the oven until the following points are ensured.

- (A) The door is tightly closed.
- (B) The door brackets and hinges are not defective.
- (C) The door packing is not damaged.
- (D) The door is not deformed or warped.
- (E) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltages more than 250V.

Removal of the outer wrap gives access to potentials above 250V.

SHARP CORPORATION

OSAKA, JAPAN

PRODUCT SPECIFICATIONS

GENERAL INFORMATION

APPEARANCE VIEW

OPERATING SEQUENCE

FUNCTION OF IMPORTANT
COMPONENTS

SERVICING AND
TROUBLESHOOTING CHART

TEST PROCEDURE

TOUCH CONTROL PANEL

COMPONENTS REPLACEMENT
AND ADJUSTMENT PROCEDURE






MICROWAVE MEASUREMENT
TEST DATA AT A GLANCE

WIRING DIAGRAM

PARTS LIST

PRODUCT SPECIFICATIONS

SPECIFICATION

ITEM	DESCRIPTION
Power Requirements	220 – 230 Volts 50 Hertz Single phase, 3 wire grounded
Power Consumption	Microwave cooking 1.55 kW Approx. 7.3 A Grill cooking 1.05 kW Approx. 4.7 A Dual cooking 2.55 kW Approx. 12.0 A
Power Output	900W watts nominal of RF microwave energy (measured by way of IEC 705) Operating frequency of 2450 MHz
Grill heating element Power Output	1000W (500W x 2)
Case Dimensions	Width 520mm Height 305mm including foot Depth 413mm
Cooking Cavity Dimensions	Width 342 mm Height 193 mm Depth 368 mm
Turntable diameter	325mm
Control Complement	<p>Touch Control System Clock (1:00 – 12:59 or 0:00 – 23:59) Timer (0 - 99 minutes 90 seconds) Microwave Power for Variable Cooking Repetition Rate;</p> <p>  HIGH Full power throughout the cooking time  MEDIUM HIGH approx. 70% of Full Power  MEDIUM approx. 50% of Full Power  MEDIUM LOW approx. 30% of Full Power  LOW approx. 10% of Full Power </p> <p> INSTANT ACTION keys EASY DEFROST key, AUTO COOK key Weight entry key, LESS(V)/MORE(A) key MINUTE TIMER/HOLD key, Time keys MICROWAVE key, GRILL key DUAL COOK key, STOP key CLOCK SETTING key MINUTE PLUS/START key </p>
Set Weight	Approx. 18.0 kg

GENERAL INFORMATION

WARNING

THIS APPLIANCE MUST BE EARTHED

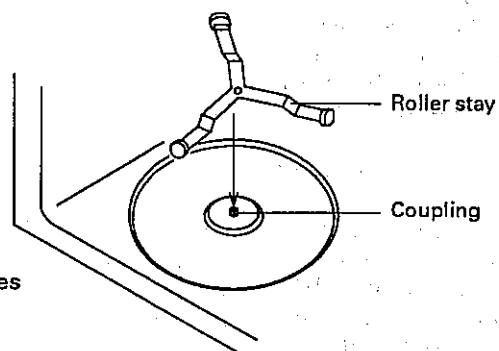
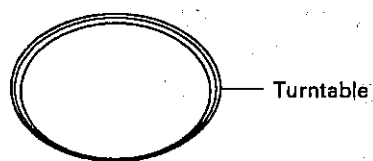
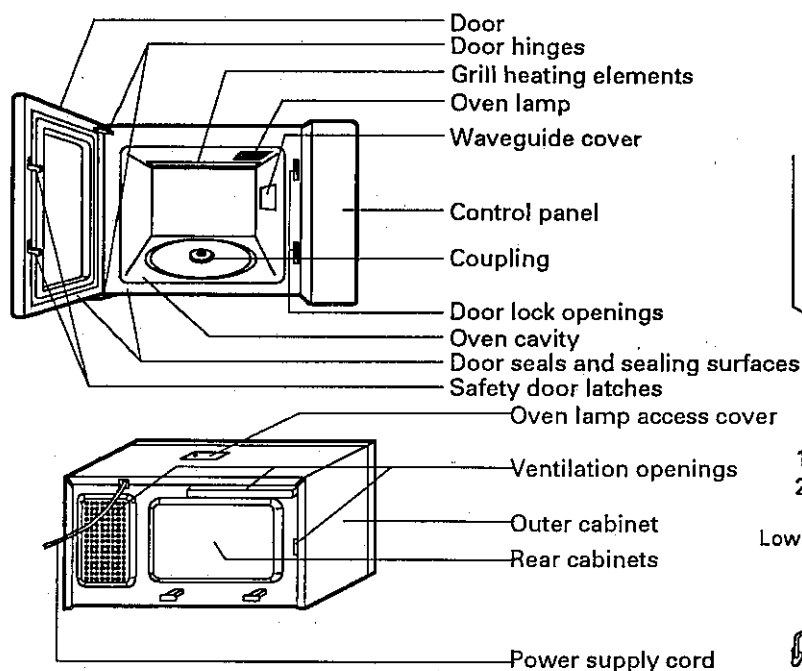
IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

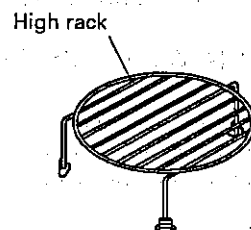
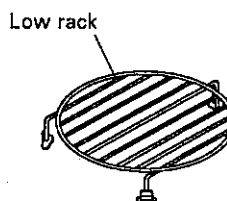
GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

APPEARANCE VIEW

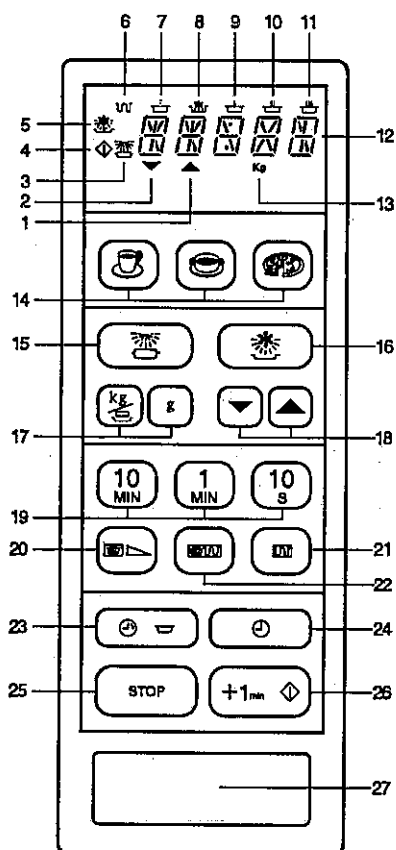
OVEN



1. Place the roller stay on the coupling.
2. Then place the turntable on it.



AUTO-TOUCH CONTROL PANEL



DISPLAY AND INDICATORS

Check indicators after the oven starts to confirm the oven is operating as desired.

1. MORE indicator
2. LESS indicator
3. AUTO COOK indicator
4. Cook indicator
This indicator shows cooking in progress.
5. EASY DEFROST indicator
6. Grill indicator
7. LOW
8. MEDIUM LOW
9. MEDIUM
10. MEDIUM HIGH
11. HIGH
12. Digital display
13. Units of weight indicator

Microwave
power level
indicators

OPERATING KEYS

14. INSTANT ACTION keys
15. AUTO COOK key
16. EASY DEFROST key
17. Weight entry keys
18. LESS (▼)/MORE (▲) keys
19. Time keys
20. MICROWAVE key
21. GRILL key
22. DUAL COOK key
23. MINUTE TIMER/HOLD key
24. CLOCK SETTING key
25. STOP key
26. MINUTE PLUS/START key
27. Door open button (▽)

OPERATING SEQUENCE

OFF CONDITION

Closing the door activates all door interlock switches (primary latch switch, 2nd latch switch and stop switch).

IMPORTANT

When the oven door is closed, the monitor switch contacts **COM — NC** must be open.

When the microwave oven is plugged in a wall outlet (220–230V 50Hz), the line voltage is supplied to the point **A3+ A5** in the control unit.

Figure O-1 on page 28

1. The display flashes "88:88".
2. To set any programmes or set the clock, you must first touch the STOP pad.
3. "88:88" appears in the display and the time counts up every minute.

NOTE: When the oven door is opened, the oven lamp comes on at this time.

MICROWAVE COOKING CONDITION

HIGH COOKING

Enter a desired cooking time with the touching Time pad and start the oven with touching START pad.

Function sequence Figure O-2 on page 28

CONNECTED COMPONENTS	RELAY
Oven lamp, Fan motor, Turntable motor	RY1
Power transformer	RY2
Surge resistor	RY3

1. The line voltage is supplied to the primary winding of the power transformer. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.
2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltage doubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channeled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays **RY1+RY2** go back to their home position. The circuits to the oven lamp, power transformer, fan motor and turntable motor are cut off.
5. When the door is opened during a cook cycle, the switches come to the following condition.

SWITCH	CONTACT	CONDITION	
		DURING COOKING	DOOR OPEN (NO COOKING)
Primary latch switch	COM — NO	Closed	Open
Monitor switch	COM — NC	Open	Closed
	COM — NO	Closed	Open
2nd latch switch	COM — NO	Closed	Open
Stop switch	COM — NO	Closed	Open

The circuits to the power transformer, fan motor and turntable motor are cut off when the primary latch switch, 2nd latch switch and stop switch are made open.

The oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay **RY1** stays closed. Shown in the display is the remaining time.

6. MONITOR SWITCH CIRCUIT

The monitor switch **SW3** is mechanically controlled by oven door, and monitors the operation of the primary switch **SW1**.

- 6-1. When the oven door is opened during or after the cycle of a cooking program, the primary latch and stop switches **SW1+SW4** must open their contacts first. After that the contacts (**COM — NC**) of the monitor switch **SW3** can be closed and then contacts of the 2nd latch switch **SW2** can be opened.
- 6-2. When the oven door is closed, the contacts (**COM — NC**) of the monitor switch **SW3** must be opened and the contacts (**COM — NO**) of the 2nd latch switch **SW2** must be closed first. After that the contacts of the primary latch and stop switches **SW1+SW4** are closed.
- 6-3. When the oven door is opened and the contacts of the primary latch switch **SW1** remain closed, the fuse **F F8A** will blow, because the monitor switch is closed and a short circuit is caused.

MEDIUM HIGH, MEDIUM, MEDIUM LOW, LOW COOKING

When the microwave oven is preset for variable cooking power, the line voltage is supplied to the power transformer intermittently within a 32-second time base through the relay contact which is coupled with the current-limiting relay **RY2**. The following levels of microwave power are given.

SETTING

HIGH	32 sec. ON		Approx. 100 %
	24 sec. ON	8 sec. OFF	
MEDIUM HIGH	18 sec. ON	14 sec. OFF	Approx. 70%
	12 sec. ON	20 sec. OFF	Approx. 50%
MEDIUM	6 sec. ON	26 sec. OFF	Approx. 30%
MEDIUM LOW			Approx. 10%
LOW			

NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 2 seconds are needed for heating up the magnetron filament.

GRILL COOKING CONDITION

In this condition the food is cooked by grill heater energy. Program desired cooking time and grill mode by touching TIME pads and GRILL pad. When the START pad is touched, the following operations occur:

Figure O-3 on page 29

1. The contact of 2nd latch switch SW2 is closed.
2. The relay RY1 and RY are energized.
3. The numbers of the digital readout start the count down to zero.
4. Then the grill heating elements, turntable motor, oven lamp, and fan motor are energized.
5. Now, the food is cooked.
6. Upon completion of the selected cooking time, audible signal sounds, and contacts of relays are opened, then the activated components as item 4 are de-energized.

DUAL COOKING CONDITION

In this condition the food is cooked by both microwave energy and grill heating elements energy simultaneously.

Figure O-4 on page 29

1. The contact of primary latch switch SW1 and 2nd latch switch SW2 are closed.
2. The relay RY1, RY2 and RY are energized.
3. The numbers of the digital readout start the count down to zero.
4. Then following components are energized.

Power transformer
Magnetron
H.V. capacitor
H.V. rectifier

Grill heating elements
Turntable motor
Fan motor
Oven lamp

5. Now, the food is cooked by microwave and grill heating elements energy simultaneously.
6. Upon completion of the selected cooking time, audible signal sounds, and contacts of relays are opened, then the activated components as item 4 are de-energized.

EASY DEFROST COOKING

EASY DEFROST automatically works out the correct microwave power and time for defrosting. What should be done is to chose menu and to enter the weight of food with the weight entry touch pad. Once the oven starts, it will cook according to the special cooking sequence.

AUTO COOK PROGRAMME

Keep on touching the AUTO COOK pad until the desired cooking programme appears in the display. Then using the WEIGHT ENTRY pad, enter the weight and touch the START pad. The cooking modes and cooking time are automatically computed and selected based on the programmes.

INSTANT ACTION

INSTANT ACTION automatically works correct microwave power and cooking time. What should be done is to key in the type of food.

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

The door can be opened by pushing the door open button on the control panel. When the door open button is pushed, the cook lever is moved upward, operating the latch head. The latch head is moved upward, and released from the latch hook. Now, the door can be opened.

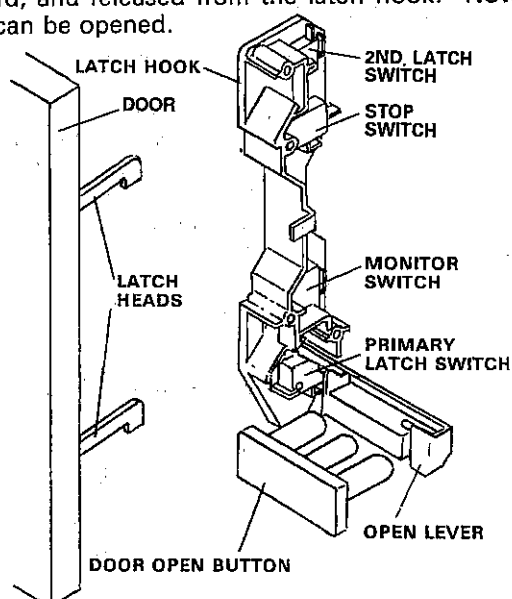


Figure D-1. Door Open Mechanism.

PRIMARY LATCH SWITCH SW1

2ND LATCH SWITCH SW2

STOP SWITCH SW4

1. When the oven door is closed, the contacts (COM-NO) must be closed.
2. When the oven door is opened, the contacts (COM-NO) must be opened.

MONITOR SWITCH SW3

1. When the oven door is closed, the contacts (COM-NC) must be opened and the contacts (COM-NO) must be closed.
2. When the oven door is opened, the contacts (COM-NC) must be closed and the contacts (COM-NO) must be closed.
3. If the oven door is opened and the contacts (COM-NO) of the primary latch switch SW1 fail to open, the fuse F1 F8A blows simultaneously with closing the contacts (COM-NC) of the monitor switch SW3.

CAUTION: BEFORE REPLACING A BLOWN FUSE F1 F8A TEST THE PRIMARY LATCH SWITCH SW1, MONITOR SWITCH SW3 AND MONITOR RESISTOR R1 FOR PROPER OPERATION.(REFER TO CHAPTER "TEST PROCEDURE".)

FUSE F1 F8A 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse also blows when primary latch switch SW1 remains closed with the oven door open and when the contacts (COM + NC) of monitor switch SW3 closes.
3. The fuse blows when the asymmetric rectifier, H.V. rectifier, H.V. wire harness, H.V. capacitor, magnetron or secondary winding of power transformer is shorted.

SPECIAL FUSE F2

If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.

THERMAL CUT-OUT 125°C TC1 (MG)

The thermal cut-out protects the magnetron against overheat. If this temperature goes up higher than 125°C because the fan motor is interrupted, the ventilation openings are blocked, the thermal cut-out TC1 will open and line-voltages to the power transformer T will be cut off and the operation of the magnetron MG will be stopped. The defective thermal cut-out TC1 must be replaced with new one.

THERMAL CUT-OUT 160°C TC2 (OVEN)

The thermal cut-out located on the top of the oven cavity is designed to prevent damage to the oven if the foods in the oven catch fire due to over heating produced by improper setting of cook time or failure of control unit. Under normal operation, the oven thermal cut-out remains closed. However, when abnormally high temperatures are reached within the oven cavity, the oven thermal cut-out will open at 160°C, causing the oven to shut down. The defective thermal cut-out TC2 must be replaced with new one.

THERMAL CUT-OUT 150°C (GRILL)

The thermal cut-out located at the bottom of the oven cavity is designed to prevent damage to the door film and the door screen when the oven operates in Grill or Dual cooking mode without any foods. Under normal operation, the oven thermal cut-out remains closed. If the temperature of the thermal cut-out goes up higher than 150°C, the thermal cut-out will open and grill heating elements will be turned off. When the temperature of the thermal cut-out goes down lower than 130°C, thermal cut-out will close again.

TURNTABLE MOTOR

The turntable motor drives the turntable roller assembly to rotate the turntable.

FAN MOTOR

The fan motor drives a blade which draws external cool air. This cool air is directed through the air vanes surrounding the magnetron and cools the magnetron. This air is channeled through the oven cavity to remove steam and vapors given off from the heating foods. It is then exhausted through the exhausting air vents at the oven cavity

NOISE FILTER

The noise filter prevents the radio frequency interference that might flow back in the power circuit.

MONITOR RESISTOR R1 3Ω/20W

The monitor resistor prevents the fuse F1 F8A 250V bursting when the fuse F1 F8A 250V blows due to the operation of the monitor switch.

SURGE RELAY RY3 AND SURGE RESISTOR R2 10Ω/20W

When the START key is touched the contacts of the surge relay RY3 close and the surge current flows through the surge resistor R2 for 200 msec. After about 20 msec. since the contacts of the surge relay close, the relay RY2 closes and supplies the power transformer with the line voltage. After 200 msec. the surge relay RY3 opens its contacts and gets out of function. The surge relay RY2 lets the current(peak current) flow when the oven is switched on. If surge resistor is defective, the home fuse or the fuse F F8A may break down when the oven is switched on (Microwave mode/Dual mode).

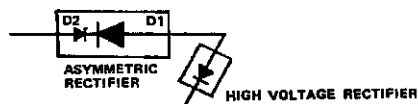
CAUTION; THE SURGE RELAY RY3 CLOSING FOR ONLY 200 msec. JUST WHEN THE OVEN GETS RESTARTED, BUT OPENS AGAIN. WITHIN THIS 200 msec., THE RELAY RY-2 MUST CLOSE.

GRILL HEATING ELEMENT GH

The grill heating element GH is located on the top of the oven cavity assembly. The grill heating element sends out heat to grill foods.

ASYMMETRIC RECTIFIER

The asymmetric rectifier is a solid state device that prevents current flow in both directions. And it prevents the temperature rise of the power transformer by blowing the fuse F1 when the high voltage rectifier is shorted.



The rated peak reverse voltage of D1 of the asymmetric rectifier is 6 KV. The rated peak reverse voltage of D2 of the asymmetric rectifier is 1.7 KV. D1 and D2 of the asymmetric rectifier or high voltage rectifier are shorted when the each peak reverse voltage goes beyond the each rated peak reverse voltage.

(The process of blowing the fuse F1)

1. The high voltage rectifier is shorted by any causes when microwave cooking.
2. The peak reverse voltage of D2 of the rectifier goes beyond the rated peak reverse voltage 1.7 KV in the voltage doubler circuit.
3. D2 of the rectifier is shorted.
4. The large electric currents flow through the high voltage winding of the power transformer.
5. The large electric currents beyond 8A flow through the primary winding of the power transformer.
6. The fuse F1 blows by the large electric currents.
7. The power supply to the power transformer is cut off.

SERVICING

WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts:

High voltage capacitor, Power transformer, Magnetron, High voltage rectifier assembly, High voltage harness.

REMEMBER TO CHECK 3D

- 1) Disconnect the supply.
- 2) Door opened, and wedged open.
- 3) Discharge high voltage capacitor.

WARNING AGAINST THE CHARGE OF THE HIGH-VOLTAGE CAPACITOR

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the power transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the power transformer.

When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and a microwave leakage test carried out.

REMEMBER TO CHECK 4R

- 1) Reconnect all leads removed from components during testing.
- 2) Replace the outer case (cabinet).
- 3) Reconnect the supply.
- 4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the microwave timer for two (2) minutes. Set the power level to HIGH and push the START button. When the two minutes has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the "Test Procedure" section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F1 (F8A) in the primary latch switch - monitor switch - monitor resistor circuit, check the primary latch switch, monitor switch and monitor resistor before replacing the fuse F1 (F8A).

TEST PROCEDURE		A	B	C	D	E	E	E	E	F	F	F	G	H	I	J	K	L						M	N	N	N	N	O
POSSIBLE CAUSE AND DEFECTIVE PARTS		MAGNETRON	POWER TRANSFORMER	H.V. RECTIFIER ASSEMBLY	H.V. CAPACITOR	PRIMARY LATCH SWITCH	2ND. LATCH SWITCH	MONITOR SWITCH	STOP SWITCH	THERMAL CUT-OUT 1500	THERMAL CUT-OUT 1500	THERMAL CUT-OUT 1600	FUSE 15A	FUSE 80A	NOISE FILTER	SURGE RESISTOR	FAN MOTOR	TURNTABLE MOTOR	GRILL HEATING ELEMENTS	POWER SUPPLY CORD	OVEN LAMP OR SOCKET	SHORTED WIRE HARNESS	OPENED WIRE HARNESS	MISADJUSTMENT SWITCHES	TOUCH CONTROL PANEL	RELAY RY-1	RELAY RY-2	RELAY RY-3	FOIL PATTERN ON P.W.B.
CONDITION	PROBLEM																												
OFF CONDITION	Fuse F2 15A browns when power cord is plugged into wall outlet.												○		○							○							
	Fuse F1 F8A browns when the door is opened.							○						○									○						
	Oven lamp does not light when door is opened. (Display appears.)								○												○	○	○		○	○			
	Home fuse browns when power cord is plugged into wall outlet.																			○		○							
	"88:88" does not appear in display when power cord is plugged into wall outlet.									○		○	○		○						○		○		○				○
	"Display does not operate properly when STOP pad is touched.								○														○	○	○				
COOKING CONDITION (COMMON)	Oven does not start when START pad is touched. (Display appears.)								○														○	○	○				
	Oven lamp does not light. (Turntable motor operates.)																			○			○						
	Fan motor does not operate. (Oven lamp light.)							○										○					○	○					
	Turntable motor assembly does not operate. (Oven lamp light.)							○											○				○	○					
	Oven or electrical parts do not stop when cooking time is 0 or STOP pad is touched.																								○	○	○	○	○
	Oven goes into cook cycle but shuts down before end of cooking cycle.									○		○						○											
	Oven stops as soon as the START pad is touched. (Except for Grill Cooking)												○	○		○							○					○	
MICROWAVE COOKING CONDITION	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power level is set at "HIGH".)	○	○	○	○	○		○															○	○	○		○		
	Oven does not operate properly during the variable cooking condition except "HIGH" cooking condition. (Oven operates properly at HIGH)																								○		○		
	Oven goes into cook cycle but shuts down before end of cooking cycle.									○		○						○											
GRILL COOKING CONDITION	Grill Heating element does not operate.										○								○				○		○				○
DUAL COOKING CONDITION	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power does not seem to be generated properly)	○	○	○	○	○		○															○	○	○		○		
	Grill Heating element does not operate.										○								○				○		○				○

TEST PROCEDURES

PROCEDURE
LETTER

COMPONENT TEST

A

MAGNETRON TEST

NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION.

CARRY OUT 3D CHECKS

Isolate the magnetron from the high voltage circuit by removing all leads connected to the filament terminal.

To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm.

To test for a short circuit filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an infinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced.

MICROWAVE OUTPUT POWER (IEC-705-1988)

The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted). Microwave output power from the magnetron can be measured by way of IEC 705, i.e. it can be measured by using water load how much it can be absorbed by the water load. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used. When P(W) heating works for t(second), approximately $P \times t / 4.187$ calorie is generated. On the other hand, if the temperature of the water with V(ml) rises ΔT ($^{\circ}\text{C}$) during this microwave heating period, the calorie of the water is $V \times \Delta T$.

The formula is as follows;

$$P \times t / 4.187 = V \times \Delta T \quad P \text{ (W)} = 4.187 \times V \times \Delta T / t$$

Our condition for the water load is as follows:

Room temperature.....around 20°C Power supply Voltage.....Rated voltage
Water load1000 g Initial temperature $10 \pm 2^{\circ}\text{C}$ Heating time 47 sec.
 $P = 90 \times \Delta T$

Measuring condition:

1. Container
The water container must be a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm.
2. Temperature of the oven and vessel
The oven and the empty vessel are at ambient temperature prior to the start of the test.
3. Temperature of the water
The initial temperature of the water is $(10 \pm 2)^{\circ}\text{C}$.
4. Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5K.
5. Select stirring devices and measuring instruments in order to minimize addition or removal of heat.
6. The graduation of the thermometer must be scaled by 0.1°C at minimum and an accurate thermometer.
7. The water load must be (1000 ± 5) g.
8. "t" is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included.

NOTE: The operation time of the microwave oven is "t + 2" sec. 2 sec. is magnetron filament heat-up time.

Measuring method:

1. Measure the initial temperature of the water before the water is added to the vessel.
(Example: The initial temperature $T_1 = 11^{\circ}\text{C}$)
2. Add the 1 litre water to the vessel.
3. Place the load on the centre of the shelf.
4. Operate the microwave oven at HIGH for the temperature of the water rises by a value ΔT of $(10 \pm 2)^{\circ}\text{C}$.
5. Stir the water to equalize temperature throughout the vessel.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER

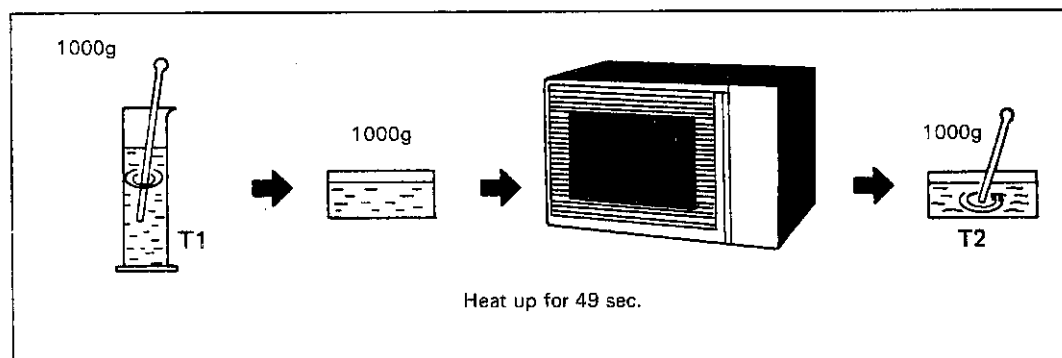
COMPONENT TEST

6. Measure the final water temperature. (Example: The final temperature $T_2 = 21^\circ\text{C}$)
7. Calculate the microwave power output P in watts from above formula.

Initial temperature	$T_1 = 11^\circ\text{C}$
Temperature after $(47 + 2) = 49$ sec.	$T_2 = 21^\circ\text{C}$
Temperature difference Cold-Warm	$\Delta T_1 = 10^\circ\text{C}$
Measured output power	
The equation is " $P = 90 \times \Delta T$ "	$P = 90 \times 10^\circ\text{C} = 900 \text{ Watts}$

JUDGMENT: The measured output power should be at least $\pm 15\%$ of the rated output power.

CAUTION: 1°C CORRESPONDS TO 90 WATTS. REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



B

POWER TRANSFORMER TEST

WARNING: High voltages and large currents are present at the secondary winding and filament winding of the power transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.

CARRY OUT 3D CHECKS.

Disconnect the leads to the primary winding of the power transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained :-

- a. Primary winding -----1.3 ohms approximately
- b. Secondary winding -----82 ohms approximately
- c. Filament winding -----less than 1 ohm

If the reading obtained are not as stated above, then the power transformer is probably faulty and should be replaced.

CARRY OUT 4R CHECKS

C

HIGH VOLTAGE RECTIFIER ASSEMBLY TEST

HIGH VOLTAGE RECTIFIER TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note

TEST PROCEDURES (CONT'D)

PROCEDURE
LETTER

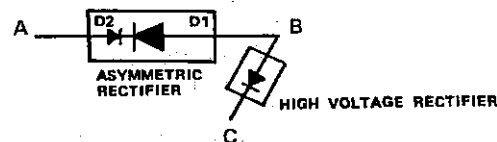
COMPONENT TEST

this second reading. The normal resistance is infinite in one direction and more than 100 k Ω in the other direction.

CARRY OUT 4R CHECKS

ASYMMETRIC RECTIFIER TEST

CARRY OUT 3D CHECKS.



Isolate the high voltage rectifier assembly from the HV circuit. The asymmetric rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminals A+B of the asymmetric rectifier and note the reading obtained. Reverse the meter leads and note this second reading. If an open circuit is indicated in both directions then the asymmetric rectifier is good. If an asymmetric rectifier is shorted in either direction, then the asymmetric rectifier is probably faulty and must be replaced with the high voltage rectifier. When the asymmetric rectifier is defective, check whether magnetron, high voltage rectifier, high voltage wire or filament winding of the power transformer is shorted.

CARRY OUT 4R CHECKS

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

D HIGH VOLTAGE CAPACITOR TEST

CARRY OUT 3D CHECKS.

- A. Isolate the high voltage capacitor from the circuit.
- B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
- C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10 M Ω after it has been charged.
- D. A short-circuited capacitor shows continuity all the time.
- E. An open capacitor constantly shows a resistance about 10 M Ω because of its internal 10 M Ω resistance.
- F. When the internal wire is opened in the high voltage capacitor, the capacitor shows an infinite resistance
- G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect readings are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS

E SWITCH TEST

CARRY OUT 3D CHECKS.

Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	Open circuit	Short circuit
Depressed	Short circuit	Open circuit

COM; Common terminal
NO; Normally open terminal
NC; Normally close terminal

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER	COMPONENT TEST
---------------------	----------------

F THERMAL CUT OUT TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the terminals of the thermal cut-out. Then using an ohmmeter, make a continuity test across the two terminals as described in the below.

CARRY OUT 4R CHECKS

Table: Thermal Cut-out Test

Condition	PARTS NAME	THERMAL CUT-OUT 125°C (MAG)	THERMAL CUT-OUT 150°C (GRILL)	THERMAL CUT-OUT 160°C (OVEN)
Temperature of "ON" condition (closed circuit).		This is not resetable type	This is not resetable type	This is not resetable type
Temperature of "OFF" condition (open circuit).		Above 125°C	Above 150°C	Above 160°C
Indication of ohmmeter (When room temperature is approx. 20°C.)		Closed circuit	Closed circuit	Closed circuit

If incorrect readings are obtained, replace the thermal cut-out.

An open circuit thermal cut-out (MG) indicates that the magnetron has overheated, this may be due to restricted ventilation, cooling fan failure or a fault condition within the magnetron or HV circuit.

An open circuit thermal cut-out (OVEN) indicates that the foods in the oven may catch fire, this may be due to over heating produced by improper setting of the cooking timer or failure of the control panel.

An open circuit thermal cut-out (GRILL) indicates that the oven cavity has overheated, this may be due to no load operation.

G BLOWN FUSE 15A F2

CARRY OUT 3D CHECKS

If the fuse F2 is blown, there could be shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS

CAUTION: Only replace fuse F2 with the correct value replacement

H BLOWN FUSE F1 F8A

CARRY OUT 3D CHECKS

1. If the fuse F1 F8A is blown when the door is opened, check the primary latch switch, monitor switch and monitor resistor.
If the fuse F1 F8A is blown by incorrect door switching replace the defective switch(s) and the fuse F1 F8A.
2. If the fuse F1 is blown, there could be a short in the asymmetric rectifier or there is a ground in wire harness. A short in the asymmetric rectifier may have occurred due to short or ground in H.V. rectifier, magnetron, power transformer or H.V. wire. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS

CAUTION: Only replace fuse with the correct value replacement.

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER

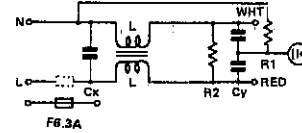
COMPONENT TEST

I NOISE FILTER TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the terminals of the noise filter.

Using an ohmmeter, check between the terminals as described in the following table.



R1: 10 M ohm \pm 20%
R2: 680K ohm \pm 20%

L(min)	Cx \pm 20%	Cv \pm 20%
1.0mH	0.22 μ F	0.0047 μ F

MEASURING POINTS	INDICATION OF OHMMETER
Between N and L	Approx. 680K ohm
Between terminal N and WHITE	Short circuit
Between terminal L and RED	Short circuit

If incorrect readings are obtained, replace the noise filter unit.

CARRY OUT 4R CHECKS

J MONITOR RESISTOR AND SURGE RESISTOR TEST

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resistor or surge resistor.

Using an ohmmeter and set on a low range.

Check between the terminals of the monitor resistor or surge resistor as described in the following table.

Table: Resistance

Resistor	Resistance
Monitor resistor	Approx. 3 Ω
Surge resistor	Approx. 10 Ω

If incorrect readings are obtained, replace the monitor resistor or surge resistor

CARRY OUT 4R CHECKS.

K MOTOR WINDING TEST

CARRY OUT 3D CHECKS

Disconnect the leads from the motor. Using an ohmmeter, check the resistance between the two terminals as described in the table below.

Table: Resistance of Motor

Motors	Resistance
Fan motor	Approximately 176 Ω
Turntable motor	Approximately 15.5k Ω

If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS

TEST PROCEDURES (CONT'D)

PROCEDURE LETTER

COMPONENT TEST

L

GRILL HEATING ELEMENT TEST

CARRY OUT 3D CHECKS

Before carrying out the following tests make sure the heating element is cool completely.

1. Resistance of heating element

Disconnect the wire leads to the heating element to be tested. Using ohmmeter with low resistance range. Check the resistance across the terminals of the heating element as described in the following table.

Table: Resistance of heating element

Parts name	Resistance
Grill heating element	Approximately $25.6\Omega \times 2 = 51.2\Omega$

2. Insulation resistance

Disconnect the wire leads to the heating element to be tested. Check the insulation resistance between the element terminal and cavity using a 500V - 100M Ω insulation tester. The insulation resistance should be more than 10M Ω in the cold start.

If the results of above test 1 and/or 2 are out of above specifications, the heating element is probably faulty and should be replaced.

CARRY OUT 4R CHECKS

M

TOUCH CONTROL PANEL ASSEMBLY TEST

The touch control panel consists of circuits including semiconductors such as LSI, ICs, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit, and troubleshooting by unit replacement is described according to the symptoms indicated.

1. Key Unit.

The following symptoms indicate a defective key unit. Replace the key unit.

- a) When touching the pads, a certain pad produces no signal at all.
- b) When touching a number pad, two figures or more are displayed.
- c) When touching the pads, sometimes a pad produces no signal.

2. Control Unit

The following symptoms indicate a defective control unit. Replace the control unit.

2-1 In connection with pads.

- a) When touching the pads, a certain group of pads do not produce a signal.
- b) When touching the pads, no pads produce a signal.

2-2 In connection with indicators

- a) At a certain digit, all or some segments do not light up.
- b) At a certain digit, brightness is low.
- c) Only one indicator does not light.
- d) The corresponding segments of all digits do not light up; or they continue to light up.
- e) Wrong figure appears.
- f) A certain group of indicators do not light up.
- g) The figure of all digits flicker.

2-3 Other possible troubles caused by defective control unit.

- a) Buzzer does not sound or continues to sound.
- b) Clock does not operate properly.
- c) Cooking is not possible.
- d) Proper temperature measurement is not obtained.

TOUCH CONTROL PANEL ASSEMBLY

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

- (1) Key Unit
- (2) Control Unit

The principal functions of these units and the signals communicated among them are explained below.

Key Unit

The key unit is composed of a matrix, signals generated in the LSI are sent to the key unit through R0₂ — R0₃, R1₁ — R1₃.

When a key pad is touched, a signal is completed through the key unit and passed back to the LSI through R2₃, R3₀ — R3₂ to perform the function that was requested.

Control Unit

Control unit consists of LSI, power source circuit, synchronizing signal circuit, ACL circuit, buzzer circuit and indicator circuit.

1) LSI

This LSI controls the key strobe signal, relay driving signal for oven function and indicator signal.

2) Power Source Circuit

This circuit generates voltage necessary in the control unit.

Symbol	Voltage	Application
VC	-5V	LSI (IC1)
VP	-29V	Fluorescent display tube : Grid and anode voltage
VF1	3Vac	Filament of fluorescent display tube
VF2		(VF1 to VF2 voltage)

3) Synchronizing Signal Circuit

The power source synchronizing signal is available in order to compose a basic standard time in the clock circuit.

It accompanies a very small error because it works on commercial frequency.

4) ACL Circuit

A circuit to generate a signal which resets the LSI to the initial state when power is supplied.

5) Buzzer Circuit

The buzzer is responsive to signals from the LSI to emit noticing sounds (key touch sound and completion sound).

6) Door Sensing Switch

A switch to "tell" the LSI if the door is open or closed.

7) Relay Circuit

To drive the magnetron, fan motor, turntable motor, surge resistor and light the oven lamp.

8) Indicator Circuit

Indicator element is a Fluorescent Display.

Basically, a Fluorescent Display is a triode having a cathode, a grid and an anode. Usually, the cathode of a Fluorescent Display is directly heated and the filament serves as cathode.

The Fluorescent Display has 6-digits, 13-segments are used for displaying figures.

DESCRIPTION OF LSI

LSI(IZA462DR)

The I/O signals of the LSI(IZA462DR) are detailed in the following table.

PIN NO.	1	SIGNAL	D10	I/O	OUT
---------	---	--------	-----	-----	-----

Digit selection signal.

Refer to the touch control panel circuit about the relation between signals and digits.

Normally, one pulse is output in every synchronized signal period, and input to the grid of the fluorescent display.

PIN NO.	2	SIGNAL	D11	I/O	OUT
---------	---	--------	-----	-----	-----

Segment data signals.

Refer to the touch control panel circuit for the relationship between signals and indicators.

Normally, one pulse is output in every synchronized signal period, and input to the anode of the fluorescent display.

PIN NO.	3	SIGNAL	TG1	I/O	OUT
---------	---	--------	-----	-----	-----

Signal to sound buzzer.

A: Key touch sound (0.12 sec.).

B: Completion sound (2.4 sec.).

PIN NO.	4	SIGNAL	Vdisp	I/O	IN
---------	---	--------	-------	-----	----

Anode (segment) of Fluorescent Display illumination voltage: -29V

Vp voltage of power source circuit input.

PIN NO.	5	SIGNAL	R0 ₀	I/O	OUT
---------	---	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

PIN NO.	6	SIGNAL	R0 ₁	I/O	OUT
---------	---	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

PIN NO.	7	SIGNAL	R0 ₂	I/O	OUT
---------	---	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

Key strobe signal.

Signal applied to touch-key section. A pulse signal is input to R2₃, R3₀ – R3₂ terminal while one of G3 line keys on key matrix is touched.

PIN NO.	8	SIGNAL	R0 ₃	I/O	OUT
---------	---	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

Key strobe signal.

Signal applied to touch-key section. A pulse signal is input to R2₃, R3₀ – R3₂ terminal while one of G4 line keys on key matrix is touched.

PIN NO.	9	SIGNAL	R1 ₀	I/O	OUT
---------	---	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

PIN NO.	10	SIGNAL	R1 ₁	I/O	OUT
---------	----	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

Key strobe signal.

Signal applied to touch-key section. A pulse signal is input to R2₃, R3₀ – R3₂ terminal while one of G6 line keys on key matrix is touched.

PIN NO.	11	SIGNAL	R1 ₂	I/O	OUT
---------	----	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

Key strobe signal.

Signal applied to touch-key section. A pulse signal is input to R2₃, R3₀ – R3₂ terminal while one of G7 line keys on key matrix is touched.

PIN NO.	12	SIGNAL	R1 ₃	I/O	OUT
---------	----	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

Key strobe signal.

Signal applied to touch-key section. A pulse signal is input to R2₃, R3₀ – R3₂ terminal while one of G8 line keys on key matrix is touched.

PIN NO.	13-15	SIGNAL	R2 ₀	I/O	OUT
---------	-------	--------	-----------------	-----	-----

Segment data signal.

Signal similar to D11.

PIN NO.	16	SIGNAL	R2 ₃	I/O	IN
---------	----	--------	-----------------	-----	----

Signal coming from touch key.

When either one of G9 line keys on key matrix is touched, a corresponding signal out of R0₂ – R0₃, R1₀ – R1₃ will be input into R2₃.

When no key is touched, the signal is held at "L" level.

PIN NO.	17	SIGNAL	R3 ₀	I/O	IN
---------	----	--------	-----------------	-----	----

Signal coming from touch key.

When either one of G10 line keys on key matrix is touched, a corresponding signal will be input into R3₀.

PIN NO.	18	SIGNAL	R3 ₁	I/O	IN
---------	----	--------	-----------------	-----	----

Signal coming from touch key.

When either one of G11 line keys on key matrix is touched, a corresponding signal will be input into R3₁.

PIN NO.	19	SIGNAL	R3 ₂	I/O	IN
---------	----	--------	-----------------	-----	----

Signal coming from touch key.

When either one of G12 line keys on key matrix is touched, a corresponding signal will be input into R3₂.

PIN NO.	20	SIGNAL	INT 1	I/O	IN
---------	----	--------	-------	-----	----

Signal synchronized with commercial source frequency(50Hz).

This is the basic timing for time processing of LSI.

PIN NO.	21	SIGNAL	GND	I/O	IN
---------	----	--------	-----	-----	----

Power source voltage: -5V

V_c voltage of power source circuit input.

PIN NO.	22	SIGNAL	AVCC	I/O	IN
---------	----	--------	------	-----	----

Connected to GND.

PIN NO.	23	SIGNAL	AN0	I/O	IN
---------	----	--------	-----	-----	----

Terminal to change cooking constant

PIN NO.	24	SIGNAL	AN1	I/O	IN
---------	----	--------	-----	-----	----

Connected to V_c.

PIN NO.	25	SIGNAL	AN2	I/O	IN
---------	----	--------	-----	-----	----

Terminal not used.

PIN NO.	26	SIGNAL	AN3	I/O	IN
---------	----	--------	-----	-----	----

Input signal which communicates the door open/close information to LSI.

Door closed; "H" level signal.

Door opened; "L" level signal.

PIN NO.	27	SIGNAL	AVSS	I/O	IN
---------	----	--------	------	-----	----

Connected to V_c.

PIN NO.	28	SIGNAL	RESET	I/O	IN
---------	----	--------	-------	-----	----

Auto clear terminal.

Signal is input to reset the LSI to the initial state when power is supplied.

Temporarily set to "H" level the moment power is supplied, at this time the LSI is set.

Thereafter set at "L" level.

PIN NO.	29	SIGNAL	TEST	I/O	IN
---------	----	--------	------	-----	----

Connected to GND.

PIN NO.	30	SIGNAL	OSC1	I/O	IN
---------	----	--------	------	-----	----

Internal clock oscillation frequency input setting.

The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to OSC1 terminal.

PIN NO.	31	SIGNAL	OSC2	I/O	OUT
---------	----	--------	------	-----	-----

Internal clock oscillation frequency control output.

Output to control oscillation input of OSC2.

PIN NO.	32	SIGNAL	VCC	I/O	IN
---------	----	--------	-----	-----	----

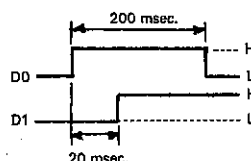
Power source voltage input terminal.

Connected to GND.

PIN NO.	33	SIGNAL	D0	I/O	OUT
---------	----	--------	----	-----	-----

Surge limiting relay driving signal.

The surge limiting relay is designed to turn on 20 msec. earlier than the cook relay.



PIN NO.	34	SIGNAL	D1	I/O	OUT
---------	----	--------	----	-----	-----

Magnetron High-voltage circuit driving signal.

To turn on and off the cook relay.

In high operation, the signals holds "H" level during microwave cooking and "L" level while not cooking. In other cooking modes (MED. HIGH, MED., MED. LOW, LOW) the signal turns to "H" level and "L" level in repetition according to the power level.

PIN NO.	35	SIGNAL	D2	I/O	OUT
---------	----	--------	----	-----	-----

Grill Heater relay driving signal.

"H" level during grill or dual cooking. "L" level otherwise.

PIN NO.	36	SIGNAL	D3	I/O	OUT
---------	----	--------	----	-----	-----

Oven lamp, turntable motor and cooling fan motor driving signal. (Square Waveform: 45Hz)

To turn on and off the control relay.

The pulse signal (45Hz) is delivered to the control relay driving circuit and cook relay control circuit.

PIN NO.	37	SIGNAL	D4	I/O	OUT
---------	----	--------	----	-----	-----

Segment data signal.

Signal similar to D11.

PIN NO.	38-42	SIGNAL	D5-D9	I/O	OUT
---------	-------	--------	-------	-----	-----

Digit selection signal.

Signal similar to D10.

7. Carefully remove four (4) screws holding magnetron to waveguide, when removing the screws hold the magnetron to prevent it from falling.
8. Remove the magnetron from the waveguide with care so that the magnetron antenna is not hit by any metal object around the antenna

9. Remove the magnetron cushion from the magnetron.

CAUTION: WHEN REPLACING THE MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND THE MAGNETRON MOUNTING SCREWS ARE TIGHTENED SECURELY.

FAN MOTOR REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the one (1) screw holding the noise filter to the chassis support.
3. Release the noise filter from the tabs of the fan duct.
4. Disconnect the wire leads from the fan motor.
5. Remove the one (1) screw holding the capacitor holder to the oven cavity back plate.
6. Remove the one (1) screw holding the fan duct to the oven cavity back plate.

7. Release the tabs of the capacitor holder from the fan duct.
8. Remove the fan duct from the oven.
9. Remove the fan blade assembly from the fan motor.
10. Remove the two (2) screws and two (2) nuts holding the fan motor to the fan duct.
11. Now, the fan motor is free.

CONTROL PANEL REMOVAL

1. CARRY OUT 3D CHECKS
2. Disconnect the main harness and stop switch harness from the control panel.

3. Remove the two (2) screws holding the control panel to the oven cavity.
4. Lift up the control panel assembly and pull it forward. Now, the control panel assembly is free.

TURNTABLE MOTOR REMOVAL

1. Disconnect the oven from power supply.
2. Remove the turntable motor cover by removing the single (1) screw.

3. Disconnect the wire lead from turntable motor and remove the two (2) screws holding the turntable motor.
4. Turntable motor is now free.

TURNTABLE COUPLING REMOVAL

1. Remove the turntable motor, refer to "Turntable Motor Removal".
2. Remove the two (2) screws holding the turntable motor support angle to the oven cavity.
3. Remove the turntable motor support angle from the oven cavity.
4. Pull the coupling out of the hole in the oven cavity.
5. At that time the turntable coupling will be free.

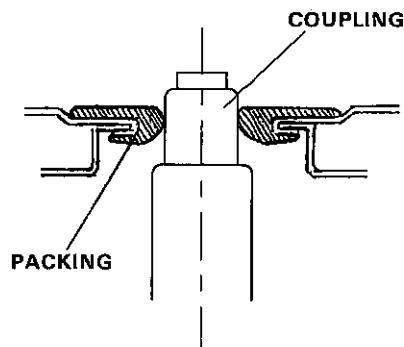


Figure C-1. Turntable Coupling

OVEN LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS
2. Pull the wire leads from the oven lamp socket by pushing the terminal hole of the oven lamp socket with the flat type small screw driver.
3. Lift up the oven lamp socket.
4. Now, the oven lamp socket is free.

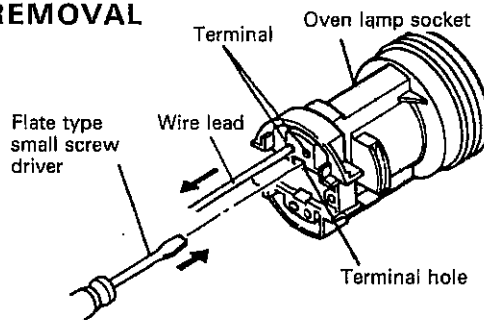


Figure C-2. Oven lamp socket

GRILL HEATING ELEMENTS REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the one (1) screw holding the exhaust duct to the oven cavity.
3. Remove the exhaust duct from the oven cavity.
4. Disconnect the wire leads from the grill heating elements.
5. Lay down the two (2) tabs holding the heater reflector to the oven cavity.
6. Remove the heater reflector from the oven cavity by sliding it toward the magnetron.
7. Make the tabs of grill heater angle straight.
8. Remove the grill heater angle, grill heating elements and the short terminal together from the heater reflector.
9. Remove the grill heater angle from the grill heating elements.
10. Remove the two (2) screws holding the short terminal to the grill heating elements.
11. Now, the grill heating elements are free.

POWER SUPPLY CORD REPLACEMENT

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the single (1) screw holding the green/yellow wire to the chassis support.
3. Disconnect the leads of the power supply cord from the noise filter, referring to the Figure C-3 (a).
4. Release the power supply cord from the rear cabinet.
5. Now, the power supply cord is free.

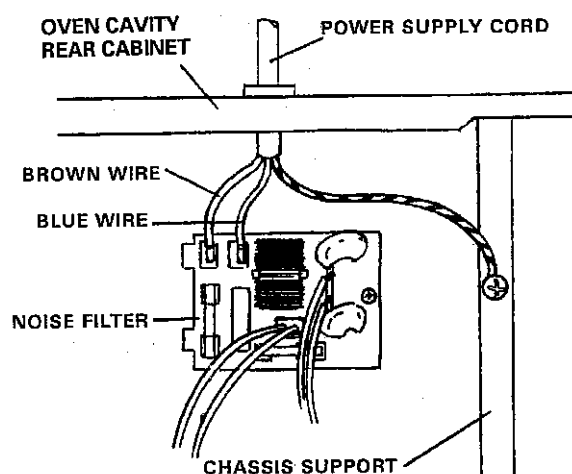


Figure C-3 (a) Replacement of Power Supply Cord

Re-install

1. Insert the moulding cord stopper of power supply cord into the square hole of the rear cabinet, referring to the Figure C-3 (b).
2. Install the earth wire lead of power supply cord and the earth angle to the chassis support with one (1) screw and tight the screw.
3. Connect the brown and blue wire leads of power supply cord to the noise filter correctly, referring to the Pictorial Diagram.

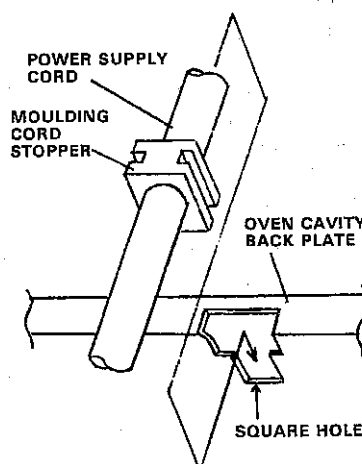


Figure C-3 (b) Replacement of Power Supply Cord

PRIMARY LATCH SWITCH, 2ND LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel assembly referring to "CONTROL PANEL REMOVAL".
3. Disconnect the leads from all switches.
4. Remove the two (2) screws holding the latch hook to the oven cavity.
5. Remove the latch hook.
6. Push the retaining tab slightly and remove the switch.

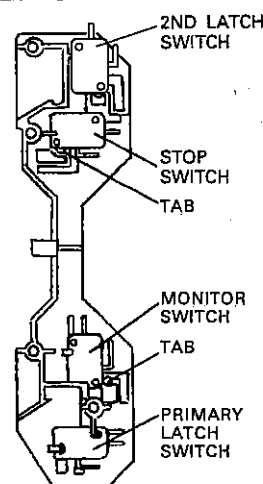


Figure C-4. Switches

PRIMARY LATCH SWITCH, 2ND LATCH SWITCH STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

If the primary latch switch, 2nd. latch switch, stop switch and monitor switch do not operate properly due to a mis-adjustment, the following adjustment should be made.

1. CARRY OUT 3D CHECKS
2. Loosen the two (2) screws holding the latch hook to the oven cavity front flange.
3. With door closed, adjust the latch hook by moving it back and forward, or up and down. In and out play of the door allowed by the latch hook should be less than 0.5 mm. The horizontal position of the latch hook should be placed where the monitor switch and 2nd latch switch have activated with the door closed. The vertical position of the latch hook should be placed where the primary latch switch and stop switch have activated with the door closed.
4. Secure the screws with washers firmly.
5. Make sure of the primary, 2nd latch switch, stop switch and monitor switch operation. If those switches have not activated with the door closed, two (2) screws holding latch hook to oven cavity front flange and adjust the latch hook position.

After adjustment, make sure of following:

1. In and out play of door remains less than 0.5 mm when latched position. First check latch hook position, pushing and pulling the door toward the oven face. The results (play of the door) should be less than 0.5mm.
2. The contacts (COM-NO) of primary latch switch and stop switch interrupt the circuit before the door can be opened.

3. The contacts (COM-NC) of the monitor switch close when the door is opened.
4. The contacts (COM-NO) of the 2nd latch switch open when the door is opened.
5. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

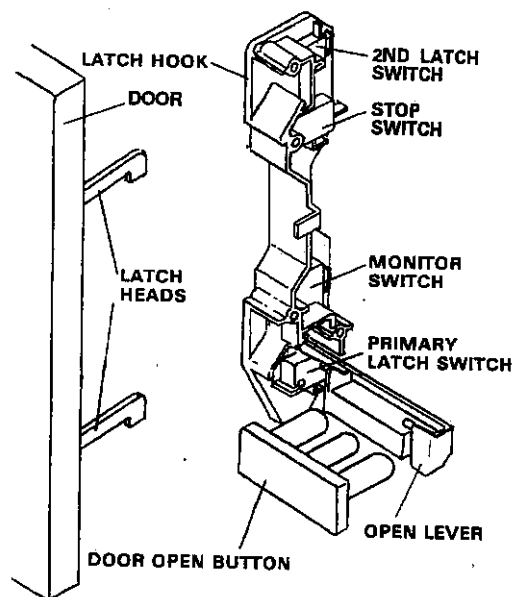


Figure C-5 Latch Switches Adjustment

DOOR FRAME AND SCREEN REMOVAL

Remove the door assembly, referring to from item 1 through item 4 of "DOOR REPLACEMENT".

1. Place the door assembly on a soft cloth with facing up.
2. Remove the choke cover, referring to "CHOKE COVER REMOVAL".
3. Remove the four (4) screws holding the door frame to the door panel assembly.

4. Release the door frame from the door panel assembly, now the door frame is free.
5. Remove the one (1) screw top of the frame inside.
6. Slide the door screen to the up side until stopped by door frame.
7. Lift up the door screen, now the door screen is free.

DOOR REPLACEMENT AND ADJUSTMENT

DOOR REPLACEMENT

1. CARRY OUT 3D CHECKS
2. Remove five (5) screws holding the upper and lower oven hinge to the oven cavity. The lower oven hinge is now free.
3. Remove door assembly with upper oven hinge by pulling it forward.
4. Separate the door assembly and upper oven hinge. Door assembly is now free.
5. Re-install upper oven hinge to the new door assembly.
6. On re-installing new door assembly, secure the upper and lower oven hinges with the five (5) mounting screws to the oven cavity. Make sure the door is parallel with bottom line of the oven face

plate and the latch head pass through the latch holes correctly.

7. CARRY OUT 4R CHECKS

Note: After any service to the door, the approved microwave survey meter should be used to assure in compliance with proper microwave radiation standards. (Refer to Microwave Measurement Procedure.)

DOOR ADJUSTMENT

When removing and/or loosening hinges such as in door replacement, the following adjustment criteria are taken. Door is adjusted to meet the following three conditions by keeping screws of hinge loose.

1. Adjust door latch heads at a position where they smoothly catch the latch hook through the latch holes. Refer to latch switch adjustments.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Reinstall outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

LATCH HEAD REMOVAL

1. Insert an iron plate (thickness of about 0.5mm)
1. Release the latch spring from the tabs of the door panel.
2. Release the latch spring from the latch head.
3. Release the latch head from the door panel.
4. Now, the latch head is free.

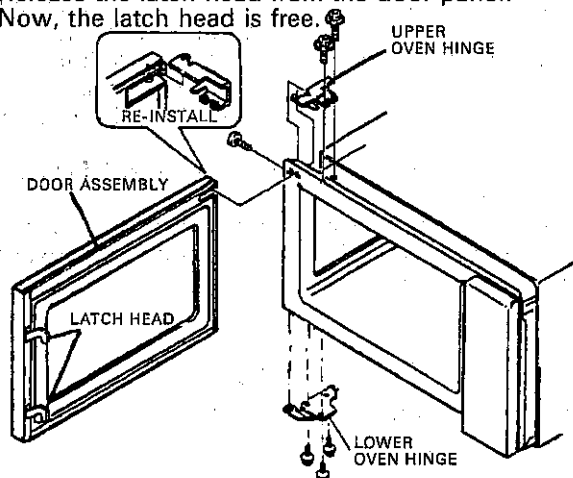


Figure C-6. Door Assembly Replacement and Adjustment

CHOKE COVER REMOVAL

1. Insert an iron plate (thickness of about 0.5mm) or flat type screw driver to the gap between the choke cover and door panel as shown figure to free the engaging part. The protect sheet may be used not to damage the door panel.
2. Lift up the choke cover, now choke cover is free.

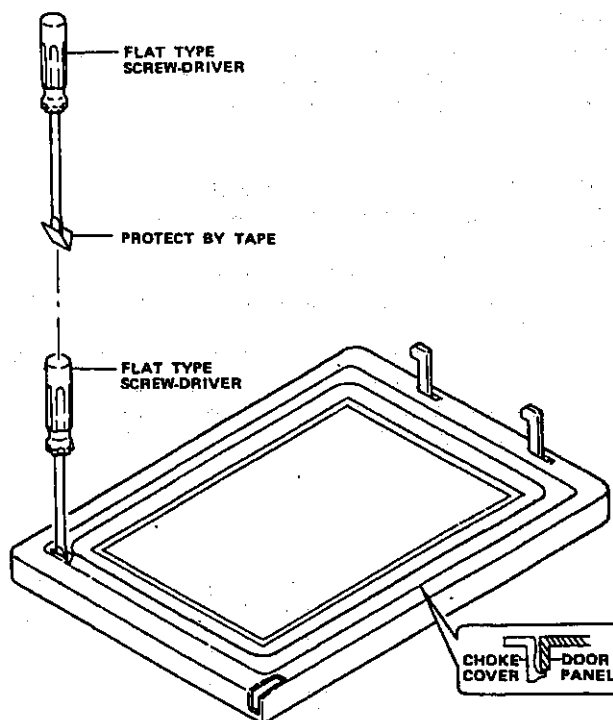


Figure C-7. Choke Cover Removal

DOOR FILM

Removal

1. Tear the door film from the door panel.
2. Now, the door film is free.

Installation

1. Put the adhesivetape on the backing film of the door film as shown in Fig. 8.
2. Tear the backing film by pulling the adhesivetape.
3. Put the pasted side of the door film on the door panel.

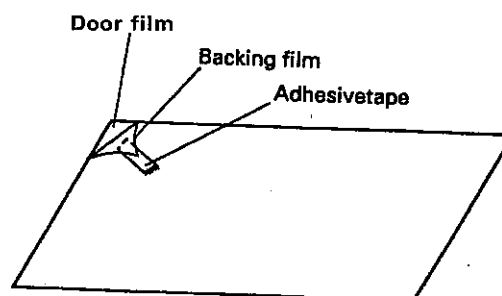


Figure C-8. Door film

MICROWAVE MEASUREMENT

After adjustment of door latch switches, monitor switch and door are completed individually or collectively, the following leakage test must be performed with a survey instrument and it must be confirmed that the result meets the requirements of the performance standard for microwave oven.

REQUIREMENT

The safety switch must prevent microwave radiation emission in excess of $5\text{mW}/\text{cm}^2$ at any point 5cm or more from external surface of the oven.

PREPARATION FOR TESTING:

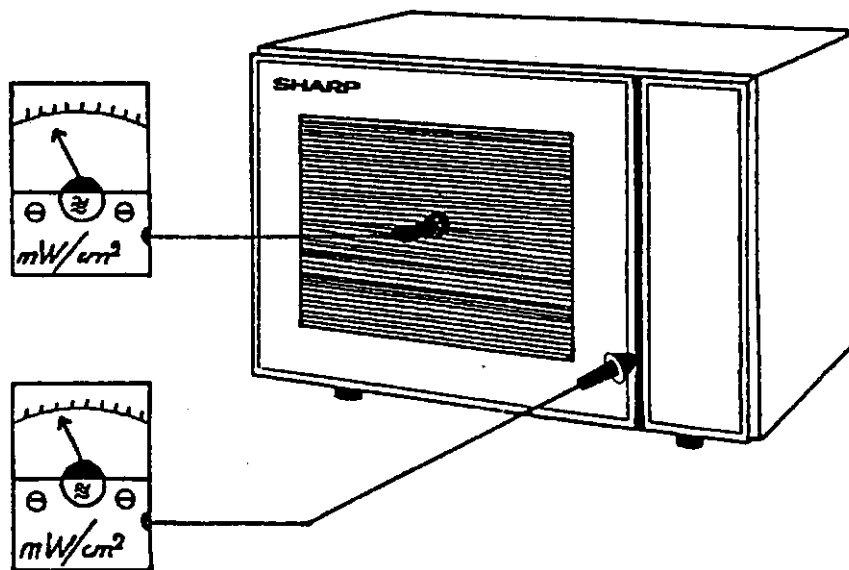
Before beginning the actual test for leakage, proceed as follows;

1. Make sure that the test instrument is operating normally as specified in its instruction booklet.
Important:
Survey instruments that comply with the requirement for instrumentations as prescribed by the performance standard for microwave ovens must be used for testing.

Recommended instruments are:

NARDA 8100
NARDA 8200
HOLADAY HI 1500
SIMPSON 380M

2. Place the oven tray into the oven cavity.
3. Place the load of $275 \pm 15\text{ml}$ of water initially at $20 \pm 5^\circ\text{C}$ in the center of the oven tray. The water container should be a low form of 600 ml beaker with inside diameter of approx. 8.5cm and made of an electrically non-conductive material such as glass or plastic.
The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4. Close the door and turn the oven ON with the timer set for several minutes. If the water begins to boil before the survey is completed, replace it with 275ml of cool water.
5. Move the probe slowly (not faster than $2.5\text{cm}/\text{sec.}$) along the gap.
6. The microwave radiation emission should be measured at any point of 5cm or more from the external surface of the oven.



Microwave leakage measurement at 5 cm distance

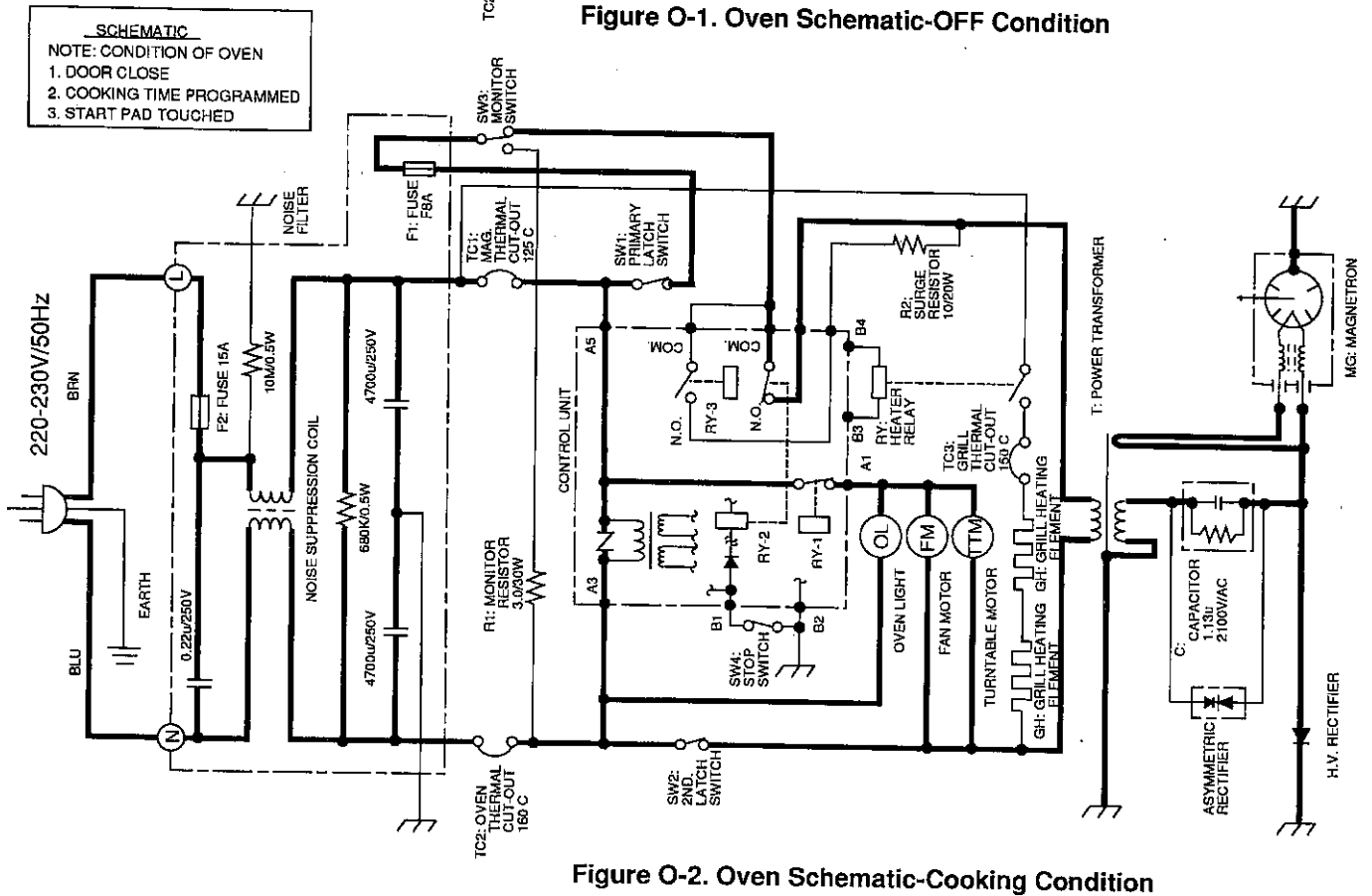
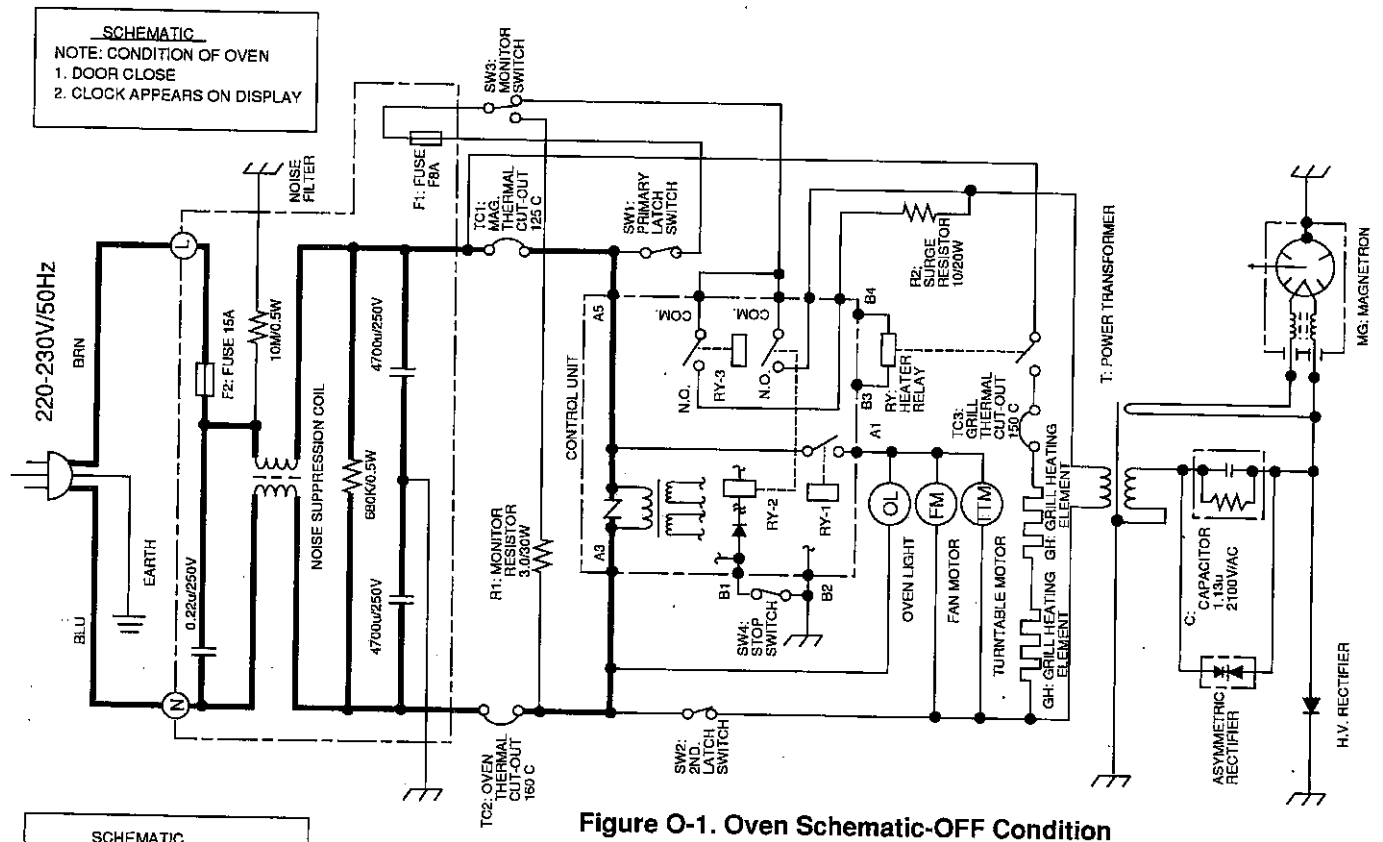
TEST DATA AT A GLANCE

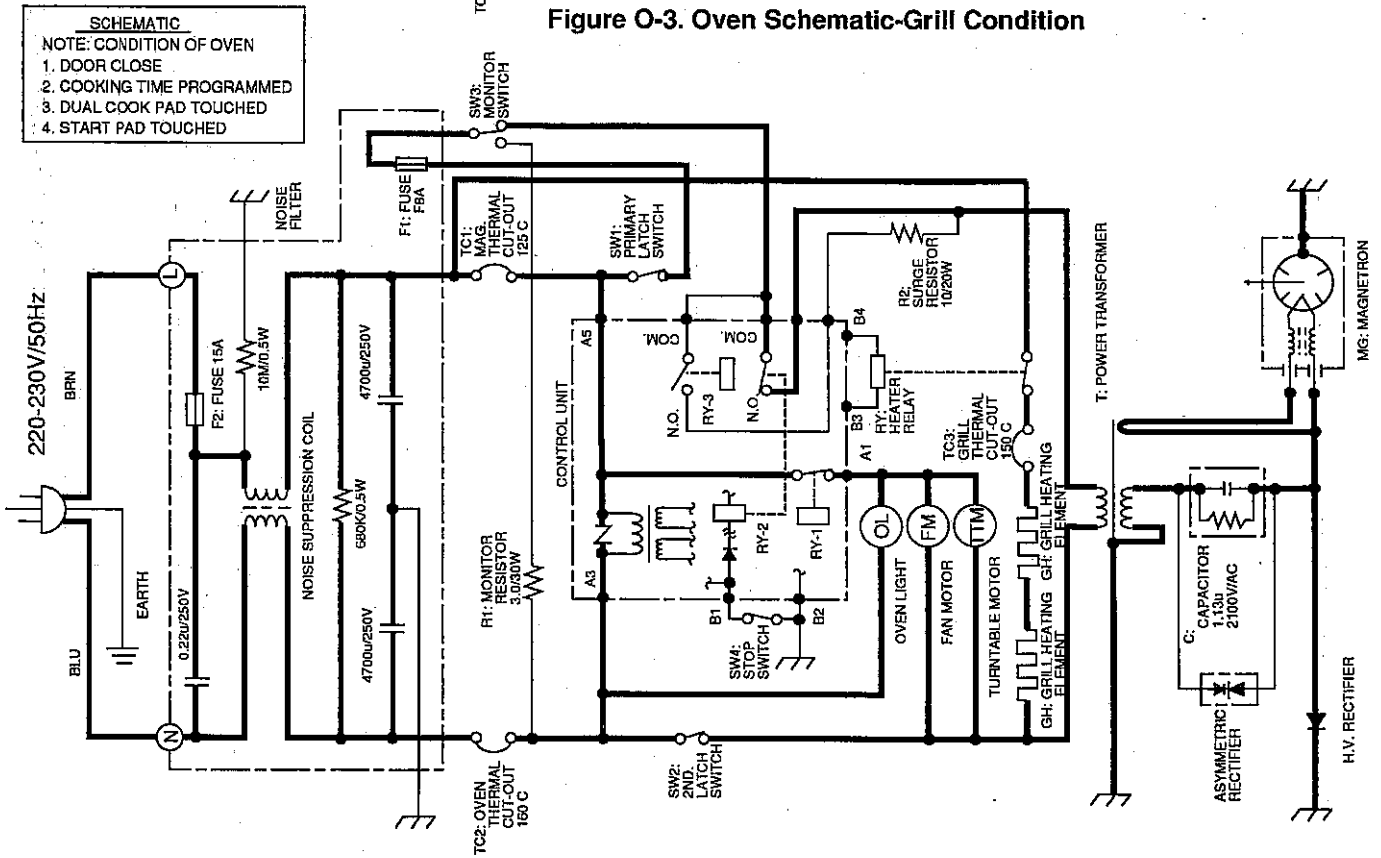
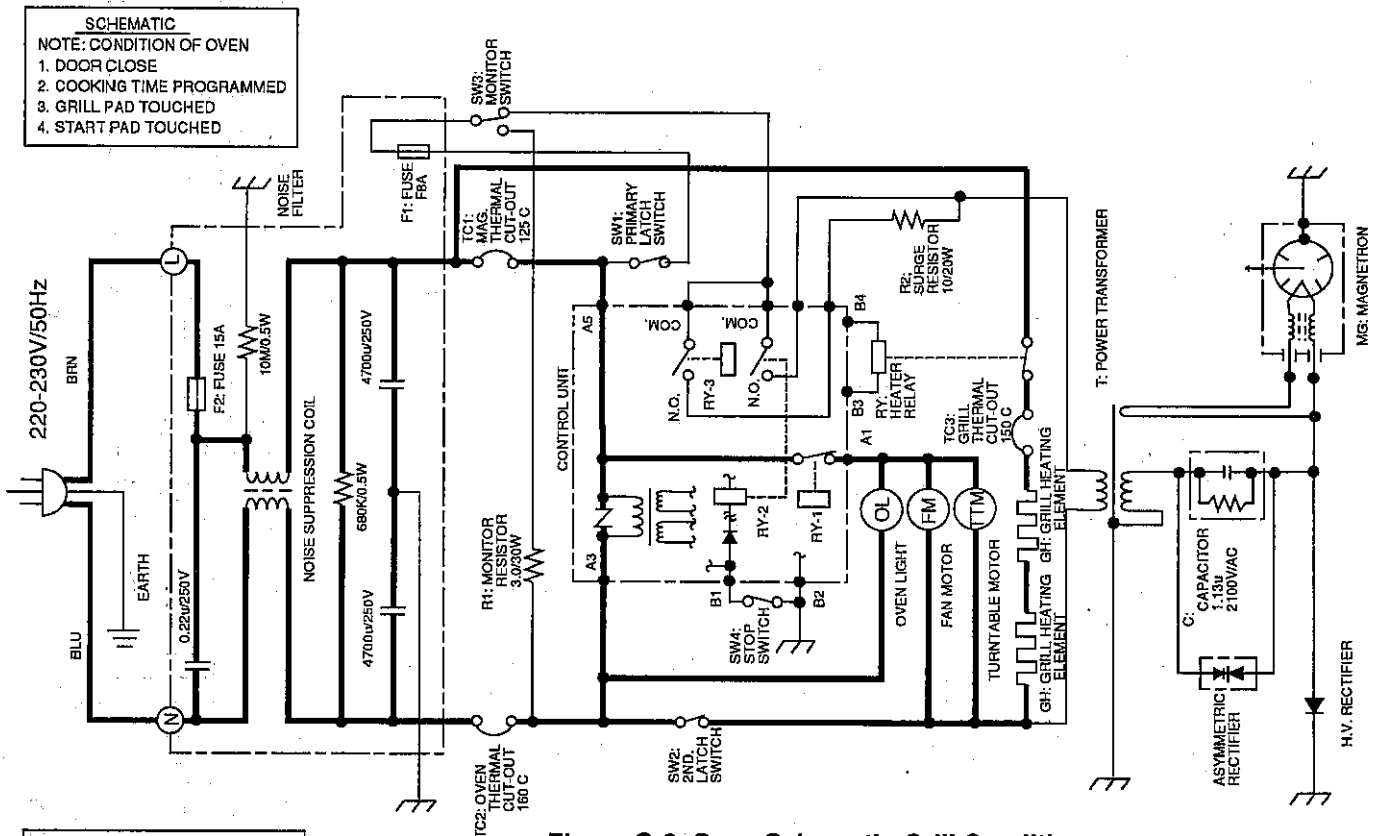
Parts	Symbol	Value / Data
Fuse	F1	F8A / 250V
Special fuse	F2	F15A / 250V
Monitor resistor	R1	3Ω 20W
Surge resistor	R2	10Ω 20W
Thermal cut-out (MG)	TC1	125°C
Thermal cut-out (OVEN)	TC2	160°C
Thermal cut-out (GRIL)	TC3	150°C
Oven lamp	OL	200–250 V 25W E14
High voltage capacitor	C	1.13μF AC 2100V
Magnetron	MG	Filament < 1Ω Filament – chassis ∞ ohm.
Power transformer	T	Filament winding < 1Ω Secondary winding Approx. 82Ω Primary winding Approx. 1.3Ω

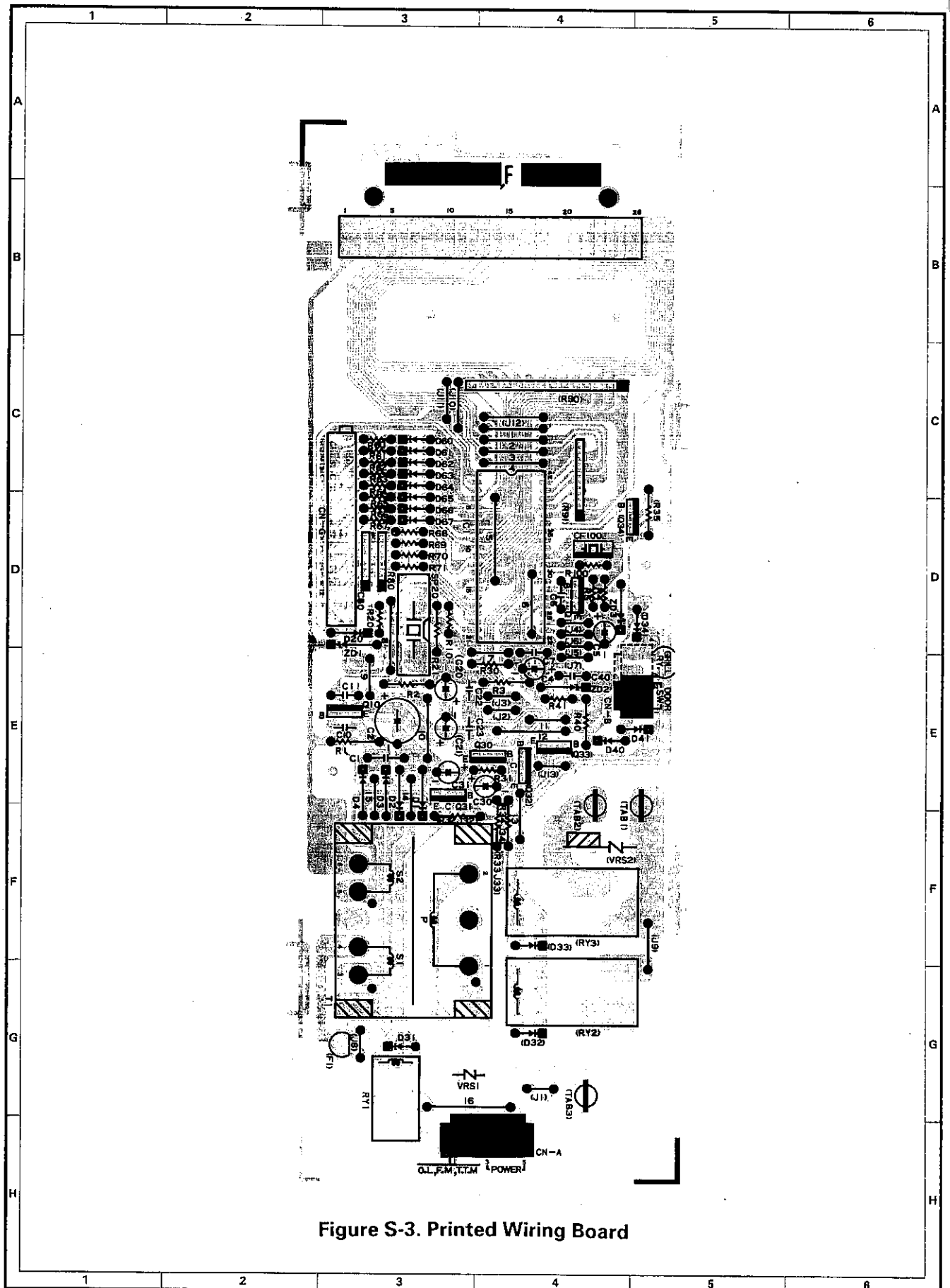
TEST POINT ON CONTROL UNIT

In/Out pit terminal	Test Point	Volt	Resistance (Disconnect the power plug and close the door.)
Input terminal (Power supply)	A3 – A5	220–230V	Approx. 920 ohm.
Input terminal (Stop switch)	B1 – B2	–	0.2 ohm
Output terminal (Oven lamp, Fan motor, Turntable motor)	A1 – A3	220–230V	Approx. 89 ohm.
Output terminal (Powertransformer)	NO. of RY2 – A3	220–230V	Approx. 4.6 ohm.
Output terminal (Earth)	B2 – Chassis	–	0.2 ohm
Output terminal (Powertransformer + Surge resistor)	NO. of RY3 – A3	–	Approx. 18 ohm.

WARNING: DISCONNECT THE PLUG WHEN MEASURING RESISTANCE.







PARTS LIST

Note: The parts marked "*" are used in voltage more than 250V.
 "5" MARK: SPARE PARTS-DELIVERY SECTION

REF. NO.	PART NO.	S	DESCRIPTION	Q'TY	CODE
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ELECTRIC PARTS

* C	RC-QZA142WREO	U	High volatage capacitor	1	AT
FM	RMOTEA243WREO	U	Fan motor	1	AU
F1	QFS-CA014WREO	J	Fuse F 8A	1	AC
F2	QFS-CA016WREO	J	Fuse 15A	1	AD
GH	FHET-A038WRKO	U	Grill heating element assembly	1	BA
* MG	RV-MZA177WREO	U	Magnetron	1	BG
OL	RLMPTA057WREO	U	Oven lamp	1	AG
R1	RR-WZA012WREO	J	Monitor resistor 3 ohm 30W	1	AL
R2	RR-WZA005WREO	J	Surge resistor 10 ohm 20W	1	AG
RY	RRLY-A036WREO	J	Heater relay	1	AM
SW1	QSW-MA085WREO	J	Primary latch switch	1	AF
SW2	QSW-MA085WREO	J	2nd latch switch	1	AF
SW3	QSW-MA087WREO	J	Monitor switch	1	AF
SW4	QSW-MA085WREO	J	Stop switch	1	AF
* T	RTRN-A353WREO	U	Power transformer	1	BN
TC1	RTHM-A078WREO	U	Thermal cut-out 125°C (Magnetron)	1	AL
TC2	RTHM-A071WREO	U	Thermal cut-out 160°C (Oven)	1	AL
TC3	RTHM-A082WREO	U	Thermal cut-out 150°C (Grill)	1	AL
TTM	RMOTDA148WREO	J	Turntable motor	1	AP
* 1- 1	FH-DZA033WREO	J	H.V. rectifier assembly	1	AP
1- 2	FPWBFA233WREO	U	Noise filter	1	AV
1- 3	FACCVA003WRKO	U	Power supply cord	1	AP
1- 4	QSOCLA011WREO	J	Oven lamp socket	1	AH

CABINET PARTS

2- 1	GCABUA383WRPO	U	Outer case cabinet (W)	1	AX
2- 1	GCABUA386WRPO	U	Outer case cabinet (B)	1	AX
2- 2	MHNG-A296WRMO	U	Lower oven hinge	1	AC
2- 3	GCOVHA289WRPO	U	Turntable cover	1	AE
2- 4	GDAI-A219WRWO	U	Base plate	1	AS
2- 5	GLEGPA028WREO	U	Foot	4	AA
2- 6	FFTASA053WRKO	U	Oven lamp access cover ass'y (W)	1	AS
2- 6	FFTASA052WRKO	U	Oven lamp access cover ass'y (B)	1	AS
2- 6-1	PCUSGA165WRPO	U	Oven lamp access cover cushion	1	AB

CONTROL PANEL PARTS

3- 1	DPWBFB051WRUO	J	Control unit	1	BN
3- 1A	QCNCMA314DREO	J	3-pin connector (A)	1	AC
3- 1B	QCNCMA337DREO	J	4-pin connector (B)	1	AB
3- 1C	QCNCWA030DREO	J	12-pin connector (G)	1	AE
3- 1D	RV-KXA052DREO	J	Fluorescent display tube	1	AU
C1	VCKYD11HF104Z	J	Capacitor 0.1μF 50V	1	AB
C2	RC-EZA316DREO	J	Capacitor 470pF 35V	1	AC
C4	RC-EZA229DREO	J	Capacitor 47μF 16V	1	AB
C5	RC-EZA314DREO	J	Capacitor 10μF 16V	1	AA
C6,7,11,40	VCKYD11CY103N	J	Capacitor 0.01μF 16V	4	AH
C10, C22-23	VCKYF31HF103Z	J	Capacitor 0.01μF 50V	3	AA
C30	RC-EZA302DREO	J	Capacitor 0.1μF 50V	1	AA
C31	RC-EZA305DREO	J	Capacitor 4.7μF 35V	1	AA
C80	RMPTEA009DREO	J	Capacitor array B5RC0122-33N (330pF x 4)	1	AE
CF100	RCRS-A010DREO	J	Ceramic resonator (CST4.00MGW)	1	AD
D1-4	VHD11ES1///-1	J	Diode (11ES1)	4	AB
D20, D31-34 D40-41, D62-63, D65-67	VHD1SS270A/-1	J	Diode (1SS270A)	12	AA
IC1	RH-IZA462DREO	J	LSI	1	AS
Q1	VSDTC143ES/-3	J	Transistor (DTC143ES)	1	AB
Q10	VSDTA143ES/-3	J	Transistor (DTA143ES)	1	AB

Note: The parts marked "*" are used in voltage more than 250V.
S MARK: SPARE PARTS-DELIVERY SECTION

REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
Q30	VSDTA114ES/-3	J	Transistor (DTA114ES)	1	AB
Q31-34	VSDTD143ES/-3	J	Transistor (DTD143ES)	4	AC
R1	VRD-B12HF432J	J	Resistor 4.3kΩ 1/2W	1	AH
R2	VRD-B12HF102J	J	Resistor 1kΩ 1/2W	1	AA
R3	VRD-B12HF122J	J	Resistor 1.2kΩ 1/2W	1	AA
R4,31	VRD-B12EF471J	J	Resistor 470Ω 1/4W	2	AA
R5,10,30	VRD-B12EF153J	J	Resistor 15kΩ 1/4W	3	AA
R20	VRD-B12EF102J	J	Resistor 1kΩ 1/4W	1	AA
R21, R62-63, R65-71	VRD-B12EF332J	J	Resistor 3.3kΩ 1/4W	10	AA
R40	VRD-B12EF101J	J	Resistor 100Ω 1/4W	1	AA
R41	VRD-B12EF512J	J	Resistor 5.1kΩ 1/4W	1	AA
R80	RR-DZA052DRE0	J	Resistor array (RGLD4X104J)	1	AB
R100	VRD-B12EF105J	J	Resistor 1MΩ 1/4W	1	AA
R(J6)	VRN-B12EK203F	J	Resistor 20kΩ(F) 1/4W	1	AA
R(J7)	VRN-B12EK183F	J	Resistor 18kΩ(F) 1/4W	1	AA
RY1	RRLY-A080DRE0	J	Relay (OJ-SH-124LM)	1	AG
RY2-3	RRLY-A089DRE0	J	Relay (DU24D1-1P(M))	2	AK
SP20	RALM-A007DRE0	J	Buzzer (PKM22EPT-CA)	1	AF
T1	RTRNPA068DRE0	J	Transformer	1	AR
VRS1	RH-VZA010DRE0	J	Varistor (TNR15G471K)	1	AE
ZD1	VHEHZ6A3///-1	J	Zener diode (HZ6A3)	1	AA
ZD2	VHEHZ5C2///-1	J	Zener diode (HZ5C-2)	1	AA
ZD3	VHEHZ5A2///-1	J	Zener diode (HZ5A-2)	1	AH
3- 2	DUNTKA545WRK0	J	Control panel frame with key unit : R-4G54(W)	1	AX
	DUNTKA546WRK0	J	Control panel frame with key unit : R-4G54(B)	1	AX
3- 3	HPNLCB076WRR0	U	Control panel : R-4G54(W)	1	AN
	HPNLCB077WRR0	U	Control panel : R-4G54(B)	1	AN
3- 4	GMADIA069WRF0	U	Display window	1	AD
3- 5	JBTN-A825WRF0	U	Open button : R-4G54(W)	1	AD
	JBTN-A826WRF0	U	Open button : R-4G54(B)	1	AD
3- 6	MSPRCA045WRE0	U	Open button spring	1	AA
3- 7	XEPSD30P10XS0	J	Screw	5	AA
3- 8	XCPD30P06X00	J	Screw	1	AA

OVEN PARTS

4- 1	DOVN-A347WRK0	U	Oven cavity	1	BQ
4- 2	LBNDKA089WRW0	U	Capacitor holder	1	AE
4- 3	PHOK-A078WRF1	U	Latch hook	1	AH
4- 4	FFANJA039WRK0	J	Fan blade assembly	1	AE
4- 5	PDUC-A503WRF0	U	Fan duct	1	AK
4- 6	LANGFA155WRP1	U	Chassis support	1	AF
4- 7	PPACGA108WRE0	U	Packing	1	AC
4- 8	LANGQA347WRP0	U	Lamp mounting angle	1	AE
4- 9	LANGQA350WRP0	U	TTM support angle	1	AC
4-10	MHNG-A295WRM0	U	Upper oven hinge	1	AD
4-11	MLEVFA074WRF0	U	Open lever	1	AD
4-12	NCPL-A043WRF0	U	Coupling	1	AE
4-13	PCOVPA263WRE0	U	Waveguide cover	1	AD
4-14	PFILWA042WRP0	U	Lamp filter	1	AB
4-15	PDUC-A509WRF0	U	Air separate duct	1	AF
4-16	PDUC-A502WRF0	U	Air intake duct	1	AF
4-17	PCUSGA355WRP0	U	H.V cushion	1	AA
4-18	PSKR-A265WRP0	U	Rear barrier	1	AH
4-19	PDUC-A514WRP0	U	Air duct	1	AH
4-20	PSPAJA001WRF0	U	Spacer	2	AA
4-21	PCUSUA346WRP0	U	Cushion	1	AA
4-22	LANGQA011WRM0	U	Earth angle	1	AA
4-23	QTANNA006WRE0	J	Short terminal	1	AB
4-24	PCUSUA366WRP0	U	Top plate cushion	1	AA
4-25	FDUC-A244WRK0	U	Exhaust duct assembly	1	AT

DOOR PARTS

5	CDORFA570WRK0	U	Door assembly (B)	1	BN
5	CDORFA567WRK0	U	Door assembly (W)	1	BN

Note : The parts marked "*" are used in voltage more than 250V.
"\$" MARK: SPARE PARTS-DELIVERY SECTION

REF. NO.	PART NO.	\$	DESCRIPTION	Q'TY	CODE
5- 1	FDORFA223WRT0	J	Door panel assembly	1	BF
5- 2	GCOVHA288WRF0	U	Choke cover	1	AL
5- 3	GWAKPA259WRF0	U	Door frame (B)	1	AS
5- 3	GWAKPA258WRF0	U	Door frame (W)	1	AS
5- 4	HPNL-A450WRE0	U	Door sxreen (B)	1	AY
5- 4	HPNL-A449WRE0	U	Door sxreen (W)	1	AY
5- 5	LSTPPA114WRF0	U	Latch head	1	AE
5- 6	MSPRTA141WRE0	U	Latch spring	1	AA
5- 7	PSHEPA424WRE0	U	Door film	1	AG
5- 8	XCPSD30P06000	J	Screw; 3mm x 6mm	1	AA
5- 9	XEBSD40P05000	J	Screw; 4mm x 5mm	1	AA

MISCELLANEOUS

6- 1	FROLPA063WRK0	U	Roller stay	1	BA
6- 2	NTNT-A007WRE0	U	Turntable	1	AS
6- 3	TCADCA475WRR0	U	Cookbook	1	AW
6- 4	TINS-A341WRR0	U	Instruction book	1	AK
6- 5	QW-QZA175WRE0	U	H.V. wire A	1	AE
* 6- 6	QW-QZA176WRE0	U	H.V. wire B	1	AE
* 6- 7	FW-VZB182WRE0	U	Main wire harness	1	AX
6- 8	TCAUHA092WRR0	U	Caution label	1	AC
6- 9	TCAUHA093WRR0	U	Belguim label	1	AB
6-10	TSPCNB770WRR0	U	Rating label	1	AH
6-11	FAMI-A067WRK0	U	High rack	1	AY
6-12	FAMI-A068WRK0	U	Low rack	1	AX
6-13	TCADCA460WRR0	U	Grill leaf let	1	AW
6-14	FW-VZB181WRE0	U	Stop switch harness	1	AG
6-15	TLABMA347WRR0	U	Menu label	1	AH

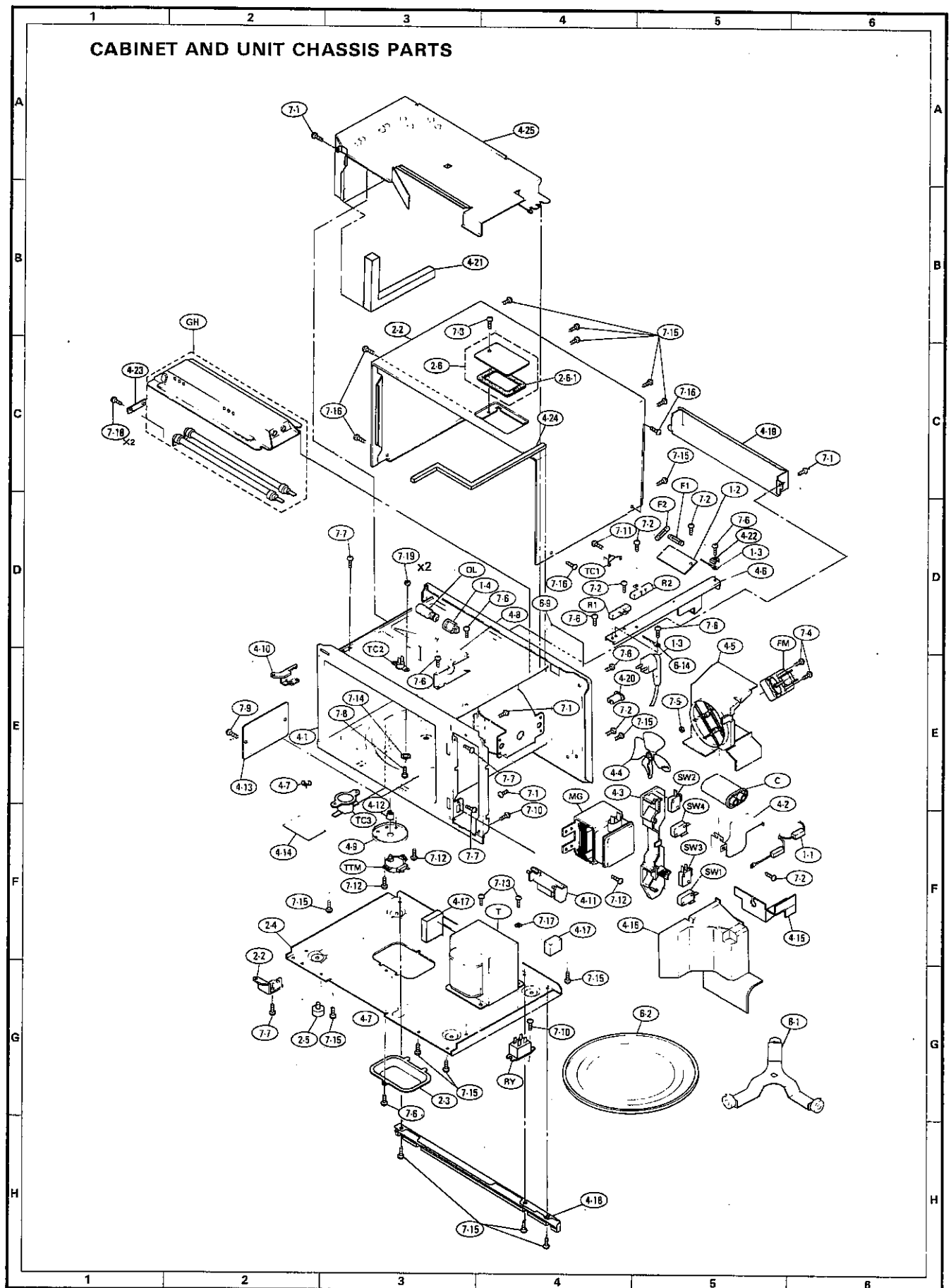
SCREW, NUT AND WASHER

7- 1	XOTSD40P10000	J	Screw 4mm x 10mm	5	AA
7- 2	XHTSD40P08RV0	J	Screw 4mm x 8mm	4	AA
7- 3	XHSSF40P08000	J	Screw 4mm x 8mm (B)	1	AA
7- 3	XHSSC40P08000	J	Screw 4mm x 8mm (W)	1	AA
7- 4	XBPSD40P22000	J	Screw 4mm x 22mm	2	AA
7- 5	XNESD40-32000	J	Nut; 4mm x 3.2mm	2	AA
7- 6	LX-EZA045WRE0	J	Special screw	6	AA
7- 7	LX-EZA046WRE0	U	Special screw	7	AA
7- 8	XBPUW30P06000	J	Screw 3mm x 6mm	2	AA
7- 9	XBPUW40P06000	J	Screw 4mm x 6mm	1	AA
7-10	XCPSD30P06X00	J	Screw 3mm x 6mm	2	AA
7-11	XCPSD30P06000	J	Screw 3mm x 6mm	6	AA
7-12	XFPSD40P08000	J	Screw 4mm x 8mm	8	AA
7-13	XFPSD50P10KS0	J	Screw 4mm x 10mm	2	AA
7-14	PPACGA120WRE0	U	Washer	2	AA
7-15	XOTSD40P12RV0	J	Screw 4mm x 12mm	13	AA
7-16	XOTSD40P12000	J	Screw 4mm x 12mm (B)	4	AA
7-16	XOTSC40P12000	J	Screw 4mm x 12mm (W)	4	AA
7-17	XWWSD50-06000	J	Washer 4mm x 0.6mm	1	AA
7-18	XBPWW30P05K00	J	Screw 3mm x 5mm	2	AA
7-19	XNESD30-24000	J	Nut 3mm x 2.4mm	2	AA

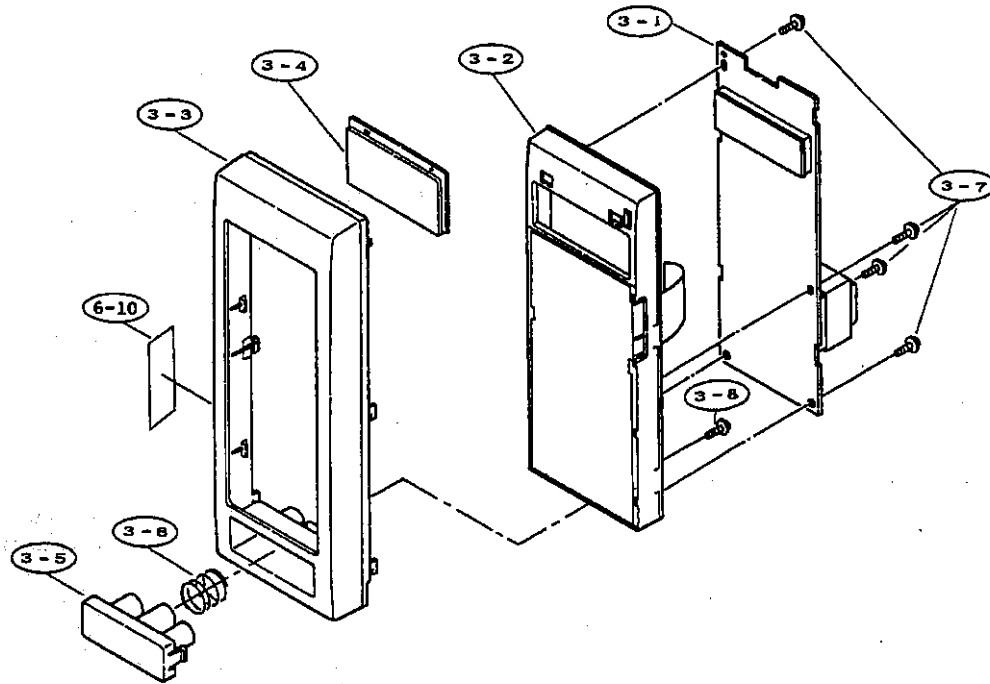
HOW TO ORDER REPLACEMENT PARTS

To have your order filled promptly and correctly, please furnish the following information.

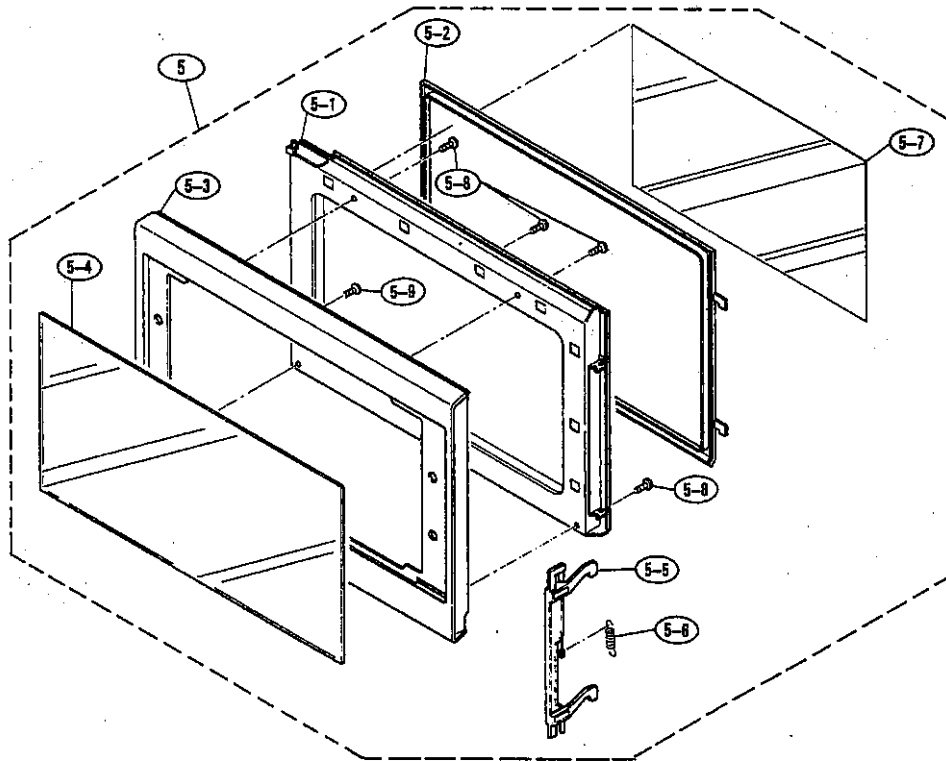
1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

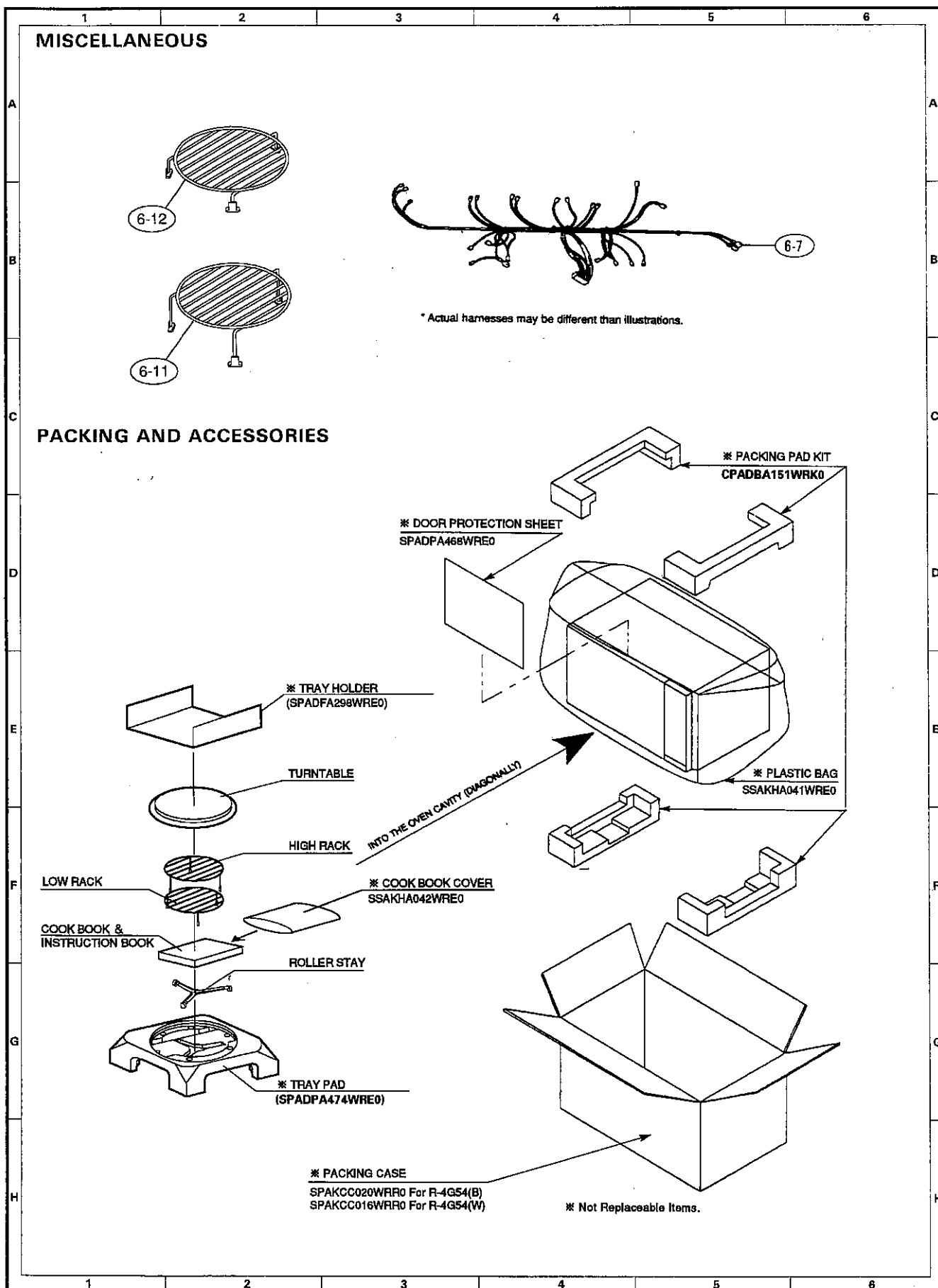


CONTROL PANEL PARTS



DOOR PARTS





SHARP®